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Improved Street Letter-Box for Lamp Posts.

In attaching letter-boxes to lamp posts, where they are made to surround the shaft of the post, many inconveniences are met with, and although this method of fastening is very secure, the inconveniences alluded to have rendered some method of accomplishing the same end without removing the lantern and ladder bar, and slipping the box over the shaft, very desirable. Our engravings show a method whereby the desired attachment is secured, with other improvements in letter-boxes, which not only render them tasteful in appearance, but more convenient in use.

The difficulties in slipping such boxes on the posts from the top, arise from the various sizes and styles of posts, the rusting fast of the ladder bar and other ornaments at the top of the post, the frequent attachment of awning frames, etc.

The box under consideration obviates all these difficulties. It is constructed in two hemispherical sections, A and B, Fig. 1.

One of these sections is cast with a flanged rim, as shown in the sectional drawing, Fig. 2, which overlaps the other, so that wedges cannot be introduced to separate them when they are bolted together. Each of the sections has lugs cast on its interior edge, through which square heade bolts with nuts are inserted to hold the hemispheres together.

It will be observed that these bolts are nserted from the inside, through the hand door, C, of the box—also used to extract the letters by the carriers—and the bolts are thus placed out of the reach of tampering.

The castings are made to conform to the shape of the post, and are fastened on the inside by bolts to the shaft so that they cannot be removed by sliding them up along the post. The joints are all rendered water-tight by suitable cement, and the globular shape of the box not only enables it to shed rain in the best manner, but also to resist blows from wheels of vehicles.

The drop holes are made without movable lids, being protected by a projecting shield, as shown. This is a great convenience, as the use of one hand only is required to insert letters. The closing of an umbrella in a rain storm, or the setting down of a basket or a child in arms, in order to put a letter in the box, is thus obviated.

POTTS' IMPROVED STREET LETTER-BOX.

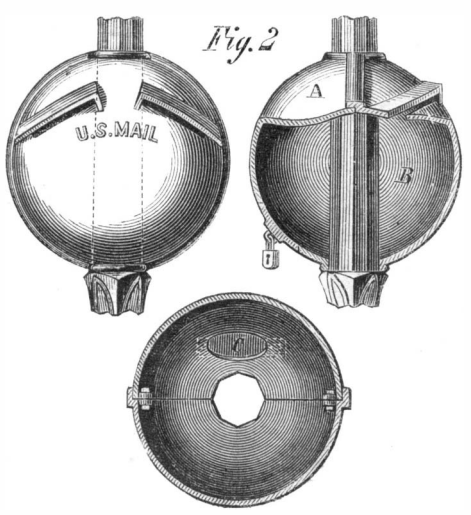
The spherical form of the box also facilitates the removal of the letters, as they collect together at the bottom of the box, the drop holes being so placed that the letters fall at right angles with the door on either side of the shaft, but not behind it.

Patented, through the Scientific American Patent Agency, December 6, 1870, by Albert Potts, of Philadelphia, Pa.

History of Carpeting.

Carpets and rugs were manufactured at a very remote period in Egypt, India, and China; but those of Persia and Turkey are the most celebrated. They were originally used for sitting and reclining upon, as may still be observed in eastern countries, where they constitute the entire furniture of the people. In Egypt they were first applied to religious purposes by the priests of Heliopolis, and were also used to garnish the palaces of the Pharaohs. It was also a custom of antiquity to place them under the couches of guests at banquets. Sardinian carpets are mentioned by Plato, the comic poet, as being disposed in this manner: "Beneath the ivory feet of purple-cushioned couches." The carpets of the Homeric age were generally white or plain cloths; but they were also sometimes produced with various colored and embroidered designs. At the supper of Iphicrates, purple carpets were spread on the floor; and at the magnificent banquet of Ptolemy Philadelphus (an account of which is given by Callixenus of Rhodes), we learn that underneath 200 golden couches "were strewed purple carpets of the finest wool, with the carpet pattern on both sides; and there were handsomely embroidered rugs, very beautifully elaborated with figures. Besides this," he adds, "thin Persian cloths covered all the center space where the guests walked, having the most accurate representations of animals embroidered on them." The Babylonians, who were very skillful in weaving cloths of divers colors, delineated upon their carpets entire groups of human figures, together with such fabulous animals as the dragon, the sphynx, and the griffin. These were numbered among the luxuries of Heliogabalus. On the tomb of Cyrus was spread a purple Babylonian carpet, and another covered the bed whereon his body was placed. These carpets were exported in considerable quantities to Greece and Rome, where they were highly esteemed. Carthage was also noted by Hermippus, Antiphanes, and others, for its magnificent carpets.

Sir J. Gardiner Wilkinson, long since dead, gives an account of an ancient carpet rug of Egyptian manufacture. "This rug," he says, "is made like many cloths of the present day, with woolen threads, on linen strings. In the center is the figure of a boy in white, with a goose above, the hieroglyphic of a 'child,' upon a green ground, around which is a border composed of red and blue lines," etc. He further informs us that there are in the Turin museum some fine specimens of worked worsted upon linen, "in which the linen threads of the weft had been picked out, and colored worsted



sewed on the warp." In these two examples we have evidence of the existence, at a very early time, of a system of tapestry weaving. The ancient carpet manufacture of the Asiatic countries may resolve itself under the appellation of needle work. Of this the present system of carpet weaving in Persia and Turkey, and the tapestry manufacture of France, may be considered as fitting examples. The tapestry, as is well known, consists of woolen or other threads sewed on the strings of the warp, by means of small shuttle needles. The Persian carpet is formed by knotting into the warp tuft after tuft of woolen yarn, over each row of which a woof shot is passed, the fingers being here employed instead of the shuttle needles, as the fabric is of a coarser description. In both methods the principle is the same. Both are formed in looms of very simple construction, the warp threads are arranged in parallel order, whether upright or horizontal, and the fabric and pattern are produced by colored threads, hand-wrought upon the warp. This may be designated the hand-wrought or needle-work method, which only makes one stitch or loop at a time, in contradistinction to the machine-wrought process, the result of mechanical appliances, whereby a thousand stitches are effected at once. Herein lies the essential difference between the ancient and modern, the simple and complex carpet manufacture.

In Persia there are entire tribes and families whose only occupation is that of carpet weaving. These dispose of their productions at the bazars to native merchants, who remove them to Smyrna or Constantinople, where they meet with European purchasers. The trade in real Persian carpets is, however, very limited, owing to their small size. They are seldom larger than hearth rugs, long and narrow. Very many of them, moreover, are considerably tarnished by exposure in bazars, if they have not indeed been already used. To render them more salable they are cleaned. This is done by cropping the surface, which in some cases is shaved quite close to the knot, hence a great portion of those brought to this country have not their original richness and depth of pile. Felted carpets or *nurmuds* are also made in Persia, but do not constitute an export commodity. Sir Henry Bethune, late Persian ambassador from England, had in his possession a very singular specimen of this felt carpeting, in which colored tufts of worsted had been inserted during the process of manufacture, producing a regular pattern when finished.

The greatest part of those Turkey carpets imported into England is manufactured at Ushak or Ouchak, in the province of Adin, about six days' journey from Smyrna, and rugs principally at Kulah or Koula, an adjacent village. In the province of Hoodavendigniar, Adana, and Nish, numerous households are employed in their production, as also in the districts of Bozah, the city of Aleppo, and the villages of Trebizond. Here and there throughout Caramania, such carpets are also made. The Turcomans of Tripoli, the women of Candia, and the peasantry of Tunis and Algiers, are likewise engaged in their fabrication. In none of these places, however, does any large manufactory exist; the carpets are the work of families and households. These carpets are woven in one piece, and there is this notable peculiarity in their manufacture, that the same pattern is never again exactly reproduced; no two carpets are quite alike. The patterns are very remarkable, and their origin is unknown even to Mussulmans. The Turkey carpet pattern represents inlaid jeweled work, which accords with eastern tales of jewels and diamonds. If this were rightly understood, it would prevent such speculations as those of Mr. Redgrave in his great exhibition report on designs, where he remarks that "the Turkish carpets are generally designed with a flat border of flowers of the natural size, and with a center of large forms conventionalized in some cases even to the extent of obscuring the forms, a fault to be avoided." This is doubtless a very ingenious mode of accounting for the curious forms of a Turkish carpet; but these, however fantastic, are never obscured, nor are there any flowers, flat or otherwise, in the border or elsewhere. The great beauty in these carpets lies in the equal balance of color, of dull neutral shades, somewhat somber in effect.

Generally throughout British India the carpet manufacture is carried on. At Benares and Moorshedabad are produced velvet carpets with gold embroidery. A very elaborate carpet sent from Cashmere to the great exhibition of Maharajah Goolah Singh, was composed entirely of silk, and excited great admiration. In every square foot of this carpet, we are informed, there were at least 10,000 ties or knots. Silk embroidered hookah carpets are made at Lahore, Mooltan, Khyrpoore Tanjore, and Bengal; cotton carpets, or *satrunjees*, at Rungpoor, Agra, and Sasseram; printed cotton carpets at Ahmedabad; printed floorcloth at Mooltah. Woolen carpets are far more extensively manufactured. Some come from Ellore, Mirzapoor, and Goruckpore, but the principal manufacture is at Masulipatam, 292 miles north of Madras. There the capital and enterprise of England have lent their aid to the rather tardy movements of the natives, and this article is now in

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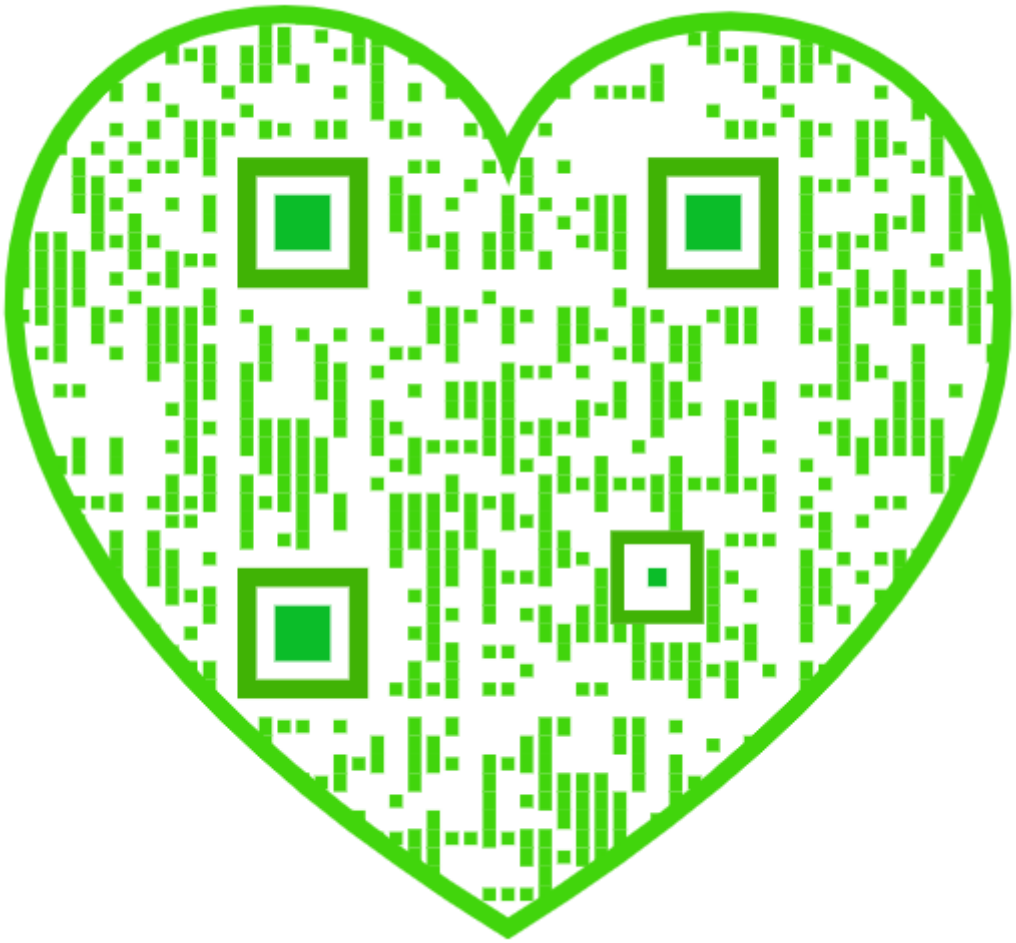

general demand. Of late years, linen warp has been introduced instead of cotton, and the fabric is thereby much improved. The design of the Indian carpets have more regularity than those of Turkey, and the colors are mostly warm negatives, enlivened with brilliant hues interspersed. For the introduction of Masulipatam carpets, as of many others into the trade, we are indebted to the firm of Watson, Bell & Co., whose Indian connection was the means of obtaining these beautiful fabrics.—*Carpet Trade.*

The Cameo-Medallion Carte-de-Visite.

The apparatus necessary for the production of cameo-medallion cartes is very simple, and comprised in the following articles:

(*a*). A four-footed metal water bath, capable of being heated by means of a spirit-lamp, into which a square porcelain dish is placed, whose overlapping sides fit over those of the water bath. This dish, which is furnished with a lip, is employed to maintain the gelatin fluid at a high temperature.

(*b*). The stamp, consisting of two square wood blocks connected together with hinges; between the blocks is fixed a brass plate also upon hinges, having in the middle an oval opening large enough to contain a bust portrait. The wood blocks open in the manner of an album, in which the brass plate, as it were, takes the place of the carte, and are, on the outside, perfectly smooth. On the inside of one of the blocks is an oval, in relief, of the exact dimensions of the opening in the metal plate; and on the other block is a corresponding hollow of oval form.

(*c*). A press which can be tightly closed by means of screws. A linen or bookbinders' press will answer the purpose well, if such can be obtained, but I have myself constructed a small wooden press expressly for the process which answers exceedingly well.

The above is all the apparatus necessary for the production of these portraits. In the first place, some pattern ovals are cut out of thick black paper, using the oval opening in the brass plate and a sharp penknife for the purpose, the cutting operation being effected at one sweep. In this way are obtained masks and small oval mats, which fit precisely into one another, and are, moreover, identical in size with the opening in the metal plate, and the relief and intaglio in the wood blocks. A print from a portrait negative, with graduated background, is then taken out of the pressure-frame, and over it is placed one of the masks, in a position most favorable to the picture; and when the same has thus been centered, the oval mat corresponding to the mask is placed upon the print, and the mask withdrawn. The print is then exposed to the sun under a glass plate, the middle being still covered with the black mat, which must not be allowed to shift from its place, and thus a darkly-tinted, or even black, margin is printed around the oval picture. The print, in this condition, is then toned, fixed and washed, and finally sized in gelatin. The latter operation is performed by the aid of some glass plates of the required size, which are carefully cleaned, as if to serve for negatives, and then rubbed over with finely-powdered stone alum (luff stone) by means of a tuft of cotton wool, the superfluous powder being afterwards removed with a soft dusting brush. These plates are coated with a four per cent normal collodion, and placed to dry in a spot free from dust. When perfectly dry, a quantity of gelatin is dissolved in hot water in a beaker, the solution being of the consistence of the collodion previously employed. This is filtered through a piece of linen into the porcelain bath, which has, in the interim, been warmed by means of the water bath, and should be maintained at an even temperature during the whole period of working.

The prints required to be gelatined are, in the first instance, trimmed to the right size by means of a cutting glass, and are then immersed bodily into the gelatin solution, so as to be fully impregnated with the same. The glass plates coated with collodion are now taken in hand; the prints laid, face downwards thereon, care being taken that all air bubbles between the paper and glass are carefully pressed out and removed; afterwards a sheet of stout white paper, somewhat bigger than the print, is cemented to the back of each photograph, a precaution for protecting the pictures in the event of their spontaneously leaving the glass on drying.

The plates are allowed to remain for ten or twelve hours (say over night) in a dry locality, and, at the end of that time, the portraits may be separated from the glass by making an incision of the film all round the paper. The superfluous paper should be trimmed off previously to the pictures being mounted upon cardboard.

After drying, the carte is put through a steel press, and is then placed in the embossing stamp to give it the desired relief.

Many of the manipulations may be slightly modified if desired. For instance, instead of cementing a piece of paper to the back of the prints, the card itself, if not very thick, may be at once attached, and the margins thereof thus gelatined, the process of rolling being in this way obviated. Some photographers add a small quantity of sugar candy to the gelatin, in order to prevent the sizing solution drying too rapidly, and to render the finished card more plastic and impressionable.

I am in possession of a large collection of these pictures, which appear as brilliant and beautiful as photographic enamels. Almost all of them have been produced by Italian firms, and by far the greater part of them have a deep-black border round the oval bust. A few of them betray a tendency to curl up at the edges, but all those which have been produced by the process I have just described have remained quite flat and even. This *modus operandi* is, moreover, to be recommended from the fact of its having been adopted by some of the first firms at Vienna, who have recently turned out some very beautiful results through its agency.—*Carl Krziwanek, in the Photographic News.*

The Toys of the Past---A Record of Departed Joys.

Itinerant toymen seem always to have dealt in a class of ware different from that sold in shops. Early in this century a Chinaman who sold a small drum, which, with peas inside, answered the purpose of a rattle, and a fish suspended at the end of a line, was as well-known a figure as the old Turk who sold rhubarb in Cheapside. There was another drum which was hung from a stick by a piece of horsehair, and when this was whirled round a rattling sound was produced, not by the drum itself, which was merely a weight, but by the friction of the horsehair against the stick. A modern and very attractive street toy was an ingenious machine, the mere movement of which causes a large flock of clay birds to flutter down a number of wires. Ten years have now elapsed since this ingenious toy was at the hight of popularity, but we do not often see it now.

The flat wooden snake, with joints of catgut, which, held by the tip of the tail, waves backwards and forwards to the terror of timid urchins, has still its place in some toy-shops; so also has the toad, whose tail, turned round, is fastened under the throat with cobbler's wax, and who leaps when the wax becomes less adhesive, though this rude method of producing spontaneous motion is driven into shade by the more perfect clockwork. But a snake made of a single spiral shaving of horn, with a solid head of the same material, which was capable of being extended to a considerable length, and which, when pressed together, was packed into a small cylindrical box, has fled beyond the limits of my observation. A fault in this mimic reptile was the ridiculously extreme delicacy of its constitution. The vertebral column, of which alone its body was composed, was always getting some unfortunate twist, and any attempt to repair the misfortune was generally followed by a compound fracture. Equally fragile were those little hollow wax dolls, which are now furnished by shops of the humblest kind, where the bottle which contains them is ranged with other bottles, scantily stocked with sugar-plums, brandy-balls, and other old-fashioned dainties. Like many specimens of the great toy, man, the little hollow doll had its social status once, though it is now in lowly places. I recollect very well the attempt of a young lady in her teens to dress such a doll. She worked with fairy fingers, but the attempt to put a sash round the waist had a result like that which is said to arise from the bite of a huge shark, and which is described in the pathetic ballad "Bryan and Pirene." Destined to perpetual destruction, the little wax doll had its avenger in the sturdy Dutch mannikin, which is utterly indestructible, save in its hair, and which, seated on a table, had a knack of bobbing forward, and assailing its proprietor with its hard, sharply pointed nose. The hollow doll's successor is the little china doll of the present day, which, always connected with a bath, seems to have been created for the purpose of perpetual ablation. Be it borne in mind that in olden times, every doll was a miniature of a grown-up person. The doll representing infancy is a modern invention, and in the French vocabulary has a name to itself, being called a "bêbè," whereas the other doll take the generic name "poupèe."

The hideous demon, made of furry material, which, by means of a worm-spring within its body, jumps out of a cubical box, continues its ugly existence; but the dainty little sentinel, who lived in a cylinder, and whose worm spring was under his feet—the only veritable Jack-in-the-box—has receded. Gone, too, is the wooden apple, which, opened, revealed another apple, which, opened, revealed a third, which, opened, revealed a fourth, and so on, till we come to a tiny fruit, which contained two tiny spoons, guaranteed to be of pure silver. Both the Jack-in-the-box and the apple plunged into bad company, and that is, perhaps, the cause of their downfall. For many years they were used as prizes at the ignoble game of "cock-spy," and were set upon slim poles to be knocked down by cunning marksmen. The apple, I suspect, was of Oriental origin. At least, dainty boxes, constructed on the same principle, but made out of the choicest woods, and elaborately ornamented, are to be found in every cabinet stocked with articles of Indian vertù.—*All the Year Round.*

The West Abutment of the St. Louis Bridge.

[From the Chief Engineer's Report].

Although the bed rock at the site of this abutment is seventy-three and a half feet higher than at the east pier, the difficulties encountered in building its foundation were of a much more perplexing and tedious character than those encountered at either of the others. Its site had been for over sixty years a part of the steamboat wharf of the city, and as such had received every kind of useless material thrown overboard from the various steamers lying over it during that time.

The old sheet iron enveloping their furnaces, worn-out grate bars, old fire bricks, parts of smoke-stacks, stone-coal cinders and clinker, and every manner of things entering into the construction of a Mississippi steamer seemed to have found a resting place at this spot, and constituted a deposit averaging twelve feet in depth over the rock. During the memorable fire of 1849, when twenty-nine steamers were destroyed at the levee, the wrecks of two of them sunk upon the site of this abutment. One of these was partly covered by the hull of the other, which probably sunk immediately afterwards, The lower one was but two or three feet above the bed rock. After this terrible conflagration the city authorities determined to widen the wharf. Its front was extended to a line inclosing about one half of these two wrecks, by filling in with stone and rubbish from the city.

During this extension several other vessels were burnt at the wharf, and the wreck of one of these also sunk upon the site of the abutment. The coffer dam, constructed to inclose the site, had to be put down through these three wrecks, the hulk of either of which was not probably less than four hundred tuns measurement. Their bottom planking was all of oak, three or four inches in thickness. To drive the sheet piling down through these hulks, an oak beam six by ten inches square, armed with a huge steel chisel, was first driven down as far as a steam pile driver could force it. It was then withdrawn, and a sheet pile, five by ten inches square, was driven down in its place.

The coffer dam was formed of two courses of sheet piling, six feet apart, which were filled in between with clay. When this was completed, the water pumped out, and the excavation prosecuted within it, the discovery was made that from one third to one half of the length of each of these three steamboat hulks was inclosed within the dam, and that some of the sheet piling had not been driven through the lower one, owing to the great resistance of the hulk and the mass above it.

Before the space between the lower wreck and the bed rock could be made secure on the inner side of the dam the water came through and flooded the inclosure. A stream from a powerful Gwynne pump, having an eight-inch diameter of jet, was then directed against the material deposited over these wrecks on the outer side of the dam, where the water was fifteen feet deep, and enough of the deposit was washed away to enable another course of sheet piling to be driven down six feet beyond the dam, through all of the wrecks to the rock. After this, that part of the wrecks inclosed between this last course of piling and the dam was removed by a diver and the space filled in with clay, and the inclosure again pumped out. This portion of the dam, about fifty feet in length, was by this construction made double. As the excavation within progressed it revealed the fact that another portion of the dam had been built and made water tight through and over a water wheel of one of the wrecks. The crank of an engine of seven feet stroke attached to the head of the shaft of the wheel was just within the inclosure, while the flanges, arms, and braces of the wheel were within the walls formed by the sheet piling.

From the inclosure within the dam were taken parts of several old and burnt steamboat engines, the iron parts of some of which had to be cut off at the dam. Four wrecks of barges, some of them in use doubtless before the era of steam, were also found within it; likewise several oak sawlogs, some anchors, chains, and a great variety of smaller articles lost or thrown overboard from the river craft, or dumped in from the city.

This incongruous deposit made it exceedingly difficult to maintain the integrity of the dam, which at times had to resist a pressure of thirty feet of water. Frequent floodings consequently occurred, which delayed and increased the cost of the work. These difficulties were, however, finally overcome, and the bed rock within was at last exposed to view.

On the 25th day of February, 1868, after thoroughly testing the solidity of the rock by drilling, the first stone of the bridge was laid in this abutment fifty-five feet below high water mark, about four months after commencing the construction of the dam.

Chilblains and Chapped Hands.

The returning cold, damp weather brings in its train the seasonable series of complaints, such as chilblains, chapped hands and lips, etc. These appear to be most prevalent just now, amongst those exposed to the inclemency of changeable weather, who possess a fair complexion, delicate skin, and other constitutional predispositions. To those especially liable to these tiresome and painful affections, we recommend as a preventive wearing kid skin gloves lined with wool, which not only keep out the cold, but absorb any moisture that may be upon the hands; and to rub over the hands before washing a small quantity of glycerin, which should be allowed to dry or become absorbed to a partial extent. When chilblains do manifest themselves, the best remedy not only for preventing them ulcerating, but overcoming the tingling, itching pain, and stimulating the circulation of the part to healthy action, is the liniment of belladonna (two drachms), the liniment of aconite (one drachm), carbolic acid (ten drops), to collodion flexile (one ounce), painted with a camel's-hair pencil over their surface. When the chilblains vesicate, ulcerate, or slough, it is better to omit the aconite, and apply the other components of the liniment without it. The collodion flexile forms a coating or protecting film, which excludes the air, whilst the sedative liniments allay the irritation, generally of no trivial nature. For chapped hands, we advise the free use of glycerin and good olive oil in the proportion of two parts of the former to four of the latter; after this has been well rubbed into the hands and allowed to remain for a little time, and the hands subsequently washed with Castile soap and tepid water, we recommend the belladonna and collodion flexile to be painted, and the protective film allowed to permanently remain. These complaints not unfrequently invade persons of languid circulation and relaxed habit, who should be put on a generous regimen and treated with ferruginous tonics. Obstinate cases are occasionally met with, which no local application will remedy, until some disordered state of system is removed, or the general condition of the patient's health improved. Chapped lips are also benefited by the stimulating form of application we advocate, but the aconite must not be allowed to get on the lips, or a disagreeable tingling results.—*London Medical Journal.*

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Labor and Wealth in the United States.

Henry Ward Beecher says: One of the greatest causes of thanksgiving is that labor whistles and sings in our territories. Elsewhere it is mourning its own death. The prodigious facilities for acquiring wealth in America are just beginning to be perceived. The wealth is here, easy to be developed, concentrated, and administered. The being "worth a million" won't make a man eligible to the class of rich men much longer. Some think wealth dangerous. Wealth is power, and that is always dangerous, but no nation ever rose from a barbarous state without it. Missionary preaching is of no use if it does not show the heathen how to make money. No poor man can be much in a poor community, although among nabobs his intellect may compensate for lack of worldly goods. But riches must be somewhere. The dangers of wealth here are less than we fear. Organized wealth oppresses the community, but will yet prove itself a benefactor. It tends to despotism because of its nascent state. It is not necessary that the wealth which owns the market should also own civility, or should control courts and legislatures. But we must consider the hygienic qualities of wealth. It is the almoner of employment, of comfort, of enjoyment. Money is vivifying industry to the very bottom of the community. Riches are the poor man's providence, and on the whole, are in subordination to intelligence and domestic virtue. How to use money is an art. Many can make money, who haven't the slightest idea of spending it correctly, while many more can spend that don't know how to make; but, as a general thing, money earned wisely is expended discreetly. Men live here in better constructed houses—which require more ingenuity to keep constructed—than anywhere else. The money-producing force of America is more than double the average money-producing force of any other nation. There are 25,000 land-owners in Great Britain. Here land is so cheap that scarcely an inhabitant but owns his plot, whether little or big. I know farmers I should hate to meet in argument unless I were on their side, while many hammer away at the anvil all day and read scientific and historical works all the evening. Men who deride money are almost invariably minus the article themselves, and, if they will only consider, will find that the universal diffusion of wealth is one of America's greatest blessings. Get rich! Pay anything for it but yourself, your honor, love, sympathy, faith in man, and faith in God. Wealth here is public spirit. Architecture is its adopted child. Cornell, Vassar, Cooper, and hundreds of others, are significant American names, and the time approaches when wealth shall be symbolic of every public improvement. Wealth has its evils and temptations, but to-day is something for which we, as a nation, may thank God, and pray that the time may not be far removed when the streets of gold spoken of in Scripture may be here on earth.

Progress in Japan.

"Great Japan, ruled by our wise Emperors, is superior to all other countries in the world." So says the Japanese patriot and philosopher, Kato Lukeichi; and certainly the most recent accounts we have of the proceedings of these orientals, places them in strong contrast with the "Western barbarians." In Japan, bridges are being built; in France, they are being blown up. In Japanese waters, numerous fixed and floating lights and buoys are being provided for the guidance of the navigation; in the Baltic, they are being removed and taken up. In the one quarter of the world the desire is that the safety of the ships may be secured; in the other, that they may be destroyed. The municipal council of Osaka is carrying out an efficient system of paving and drainage; is macadamizing their suburban roads, and adorning the city by planting 500 or 600 trees. On the other hand, the drainage of the Western continent is blocked and corrupted by the corpses of men and the carcasses of horses, and Paris, the fairest city of the West, is being made a great pest and charnel house, and the vernal beauties of the environs have been stamped out, and they have been changed into a hideous wilderness. The princes of Japan are fitting up improved machinery at their coal mines, and building cotton mills; the princes of Prussia are "assisting" in the destruction of grand and venerable cathedrals, splendid libraries, and the most beautiful works of nature and art, and are making "requisitions" for bread and wine to a ruined and starving population. The disastrous doings of the Westerns in prosecuting the art of war we know of but too well, from the harrowing details with which our daily papers are filled; of the more humane and creditable performances of the orientals, in prosecuting the arts of peace, we are informed by her Majesty's consuls at the Japanese ports open to foreign commerce. These reports have been published quite recently. The foreign trade done at these ports—Karrawaga, Hiogo, and Osaka, Nagasaki, Haokdati, and Niigata—may, according to Sir Henry Parkes, be taken at ten millions sterling, of which above half is in British hands. It gave employment, in 1869, to 1,043,405 tuns of foreign shipping, 398,264 tuns of which were British. The returns of shipping are exclusive of native junks and river boats. At some of the ports, the large proportion of the trade conducted by British ships is very remarkable, the proportion being greater than that done by the foreign vessels of all other nations together. The foreign commerce of Japan, considering area and population, is growing, it appears, more rapidly and satisfactorily than even that of China. The total imports, in 1869, were of the value of 17,356,932 dols., and the exports 11,475,645 dols.

The Hartford Steam Boiler Inspection and Insurance Company.

The Hartford Steam Boiler Inspection and Insurance Company makes the following report of its inspections for October, 1870:

During the month 522 visits of inspection were made and 920 boilers examined—702 externally and 234 internally, while 136 were tested by hydraulic pressure. Number of defects in all discovered, 418—number of dangerous defects, 44, which in detail are as follows:

Furnaces out of shape, 12—1 dangerous; fractures in all, 13—5 dangerous; burned plates, 22—2 dangerous; blistered plates, 51—8 dangerous; cases of sediment and deposit, 72—5 dangerous; cases of incrustation and scale, 50—4 dangerous; cases of external corrosion, 22—4 dangerous; cases of internal corrosion, 15—1 dangerous; cases of internal grooving, 5; water gages out of order, 4—2 dangerous; safety valves overloaded 20—2 dangerous; pressure gages out of order, 74, varying from —10 to +20; boilers without gages, 2—1 dangerous; cases of deficiency of water, 8—2 dangerous; broken braces and stays, 12; boilers condemned, 6—6 dangerous. Two cases have been found where there were stopcocks between the safety valve and boiler. They were both removed before the boilers could be accepted by this Company. Several mud drums have been found in bad condition. These drums are usually bricked in, and cannot be thoroughly examined unless the brick work is removed. They corrode rapidly, and should be examined at least once a year.

As will be seen there have been 11 explosions during the month, by which 9 persons were killed, and many wounded. Several of these explosions were of new boilers. Many people think that when they have put new boilers in their works, they are perfectly safe. Such, however, seems not to be the fact. One of the most terrific explosions which has occurred within the year, was of a new boiler. From subsequent examination, a fracture was discovered in one of the flues, which was regarded as the cause of the accident. From unequal expansion and contraction, resulting from urging the fires injudiciously, the fracture came, and so far as could be ascertained, the flue collapsed, and an explosion followed. The six boilers condemned have been replaced by new ones.

PERPETUAL MOTION.

NUMBER III.

The two self-movers, which it has been claimed were really such, were the inventions of the Marquis of Worcester, author of the "Century of Inventions," and Jean Ernest Elie-Bessler Orffyre, or Orphyrreus, who is usually named Orffyreus in English and German works. The latter was born in 1680, near Zittau, in the department of Alsace, France, and early studied theology and medicine, but his erratic genius was only to be satisfied by engaging himself in the pursuit of a variety of the mechanical arts and painting. He asserts that it was during his search for whatever might prove curious and valuable that he discovered perpetual motion, and between the years 1712 and 1719, made two machines on his system; one he desired to exhibit publicly, but broke it up rather than submit to the payment of the license or tax required by the Government of Cassel; the other he destroyed after its having been unfavorably reported on by M.'S Gravesande. He published, in German and Latin, a book or pamphlet entitled "*Le Mouvement Perpétuel Triompliant*," quarto, dated Cassel, 1719. Other accounts differ respecting the breaking of the second machine; and, on insufficient authority, Mr. Partington styles him a "German mechanic." Dr. William Kenrick, among his miscellaneous works, wrote "An Account of the Automaton, or Perpetual Motion of Orffyreus, with additional remarks," in editions dated 1770 and 1771. Orffyreus died in November, 1745.

The following is a description of the Marquis of Worcester's wheel, described in the 56th article of the "Century of Inventions," as "An Advantageous Change of Centers."

"To prouide and make that all y^e^ weights of y^e^ defcending syde of a wheele shal be perpetually further from y^e^ center, then thofe of y^e^ mounting syde, and yett equal in number and heft of ye one syde as y^e^ other. A most incredible thing if not seene, butt tryed before y^e^ late King of happy and glorious memorye in y^e^ Tower by my directions, two Extraordinary Embaffadors accompanying his Ma^tie^ and y^e^ D. of Richmond, D. Hamilton, and most part of y^e^ Court attending him. The wheele was 14 foote ouer, and 40 weights of 50 p^d^ apiece; S Wm. Belford, then Lieu^t^ of y^e^ Tower, and yet liuing can justify it with seuerall others; they all saw that noe sooner these great weights passed y^e^ Diameter Line of y^e^ vpper syde but they hung a foote further from y^e^ center, nor no sooner passed the Diameter line of the lower syde, butt they hung a foote nearer; bee pleased to judge y^e^ consequence."

Of the inventions of these two men Dircks says:

"The only appeal that can be made in apology for the pursuit of perpetual motion, is derivable from the results represented to have been obtained by the Marquis of Worcester in one instance, and by Orffyreus in another. All the circumstances relating to their singular inventions excite our curiosity, raise our skepticism, and induce us to pause in our decision. Let us first consider the inventors personally; and, secondly, their inventions and the circumstances attending their exhibition. The two men were of very different character and position in life. The first noble by birth, of ancient lineage, loyal to the extent of sacrificing his property in support of the cause of Charles I., and evidencing by his prayers, his truly religious sentiments. About or before 1648 (as the King died 1649), he exhibited his wheel, or perpetual motion, in the Tower, before his Majesty, two extraordinary Ambassadors, the Duke of Richmond, Duke Hamilton, most part of the Court, and Sir William Belford, Lord Lieutenant of the Tower. We have to consider the upright character of the Marquis, his having invented the steam engine, his worthiness in all respects, and the circumstances here detailed, and then ask ourselves: Little as Science favors any belief in such an invention, can we see any reasonable grounds for error in this great experiment, or believe that a person so distinguished, and so much to be admired in all other respects, could thus boldly and recklessly deceive himself, his noble company, and the public taking ten years or upwards to elaborate and record a gross falsehood? It seems incredible, and true respect for the Marquis' memory will go far to maintain doubts respecting the infallibility of all mathematical demonstrations adverse to the possibility of a self-motive power. Secondly:

"Orffyreus was of humble origin, had versatile talents, and fickle, discontented, unsettled, irregular, and eccentric. He was ambitious, boasting, and the very man to raise up enemies. Between 1712 and 1718 he made and destroyed in succession four wheels or machines. He had learnt the art of clock-making, and several mechanical arts, and is supposed to have constructed or put these wheels together himself. He had a princely patron, who wished to obtain practical results from the invention for manufacturing and other operations. A misunderstanding ensues; and from that time to his death, in 1745—at least twenty-eight years—the subject lies dormant, and the invention dies with him. This last fact, coupled with the wheel having raised so great a weight as 70 lbs., makes a doubtful case still more doubtful; and particularly when, about the same time, Geiser imposed on the German public with a mere piece of clockwork, as a true perpetual motion.

"The Marquis of Worcester's wheel was fourteen feet in diameter; it was rotated by the action of forty 50-lb. weights —2,000 lbs—an enormous weight, requiring some very laborious operations of the carpenter to erect a sufficiently strong framework. Its completion must have taken some time, and led to frequent visits from the noble inventor, as well as experiments to test its correct working, before offering a practical demonstration before majesty.

"Orffyreus' fourth or last wheel, at Hesse Cassel, was twelve feet in diameter, fourteen inches broad, made of light oak framing, and covered with oil cloth. It would revolve either way, and this alone casts a shade of doubt on there being any deception in practice with it. But, strange to say, it had power enough to raise 70 lbs. to a considerable hight. Its operations were seen and attested by so many, that these broad facts rest not alone on the inventor's authority. It was so ingeniously made, that M. Gravesande wrote to Sir Isaac Newton on the subject; and his letter and mathematical reasonings, in reference to the matter, appear in his works, edited by Professor Lalande, 1774."

The following is the letter written by Professor 'S. Gravesande to Sir Isaac Newton, in regard to the wheel of Orffyreus.

SIR,—Doctor Desaguliers has doubtless shown you the letter that Baron Fischer wrote to him some time ago, about the wheel of Orfyreus, which the inventor affirms to be a perpetual motion. The landgrave, who is a lover of the sciences and fine arts, and neglects no opportunity to encourage the several discoveries and improvements that are presented him, was desirous of having this machine made known to the world, for the sake of public utility. To this end he engaged me to examine it; wishing that, if it should be found to answer the pretensions of the inventor, it might be made known to persons of greater abilities, who might deduce from it those services which are naturally to be expected from so singular an invention. You will not be displeased, I presume, with a circumstantial account of this examination; I transmit you, therefore, a detail of the most particular circumstances observable on an exterior view of a machine, concerning which the sentiments of most people are greatly divided, while almost all the mathematicians are against it. The majority maintain the impossibility of a perpetual motion, and hence it is that so little attention hath been paid to Orfyreus and his invention.

For my part, however, though I confess my abilities inferior to those of many who have given their demonstrations of this impossibility; yet I will communicate to you the real sentiments with which I entered on the examination of this machine. It is now more than seven years since I conceived I discovered the paralogism of those demonstrations, in that, though true in themselves, they were not applicable to all possible machines, and have ever since remained perfectly persuaded, it might be demonstrated that a perpetual motion involved no contradiction; it appearing to me that Leibnitz was wrong in laying down the impossibility of the perpetual motion as an axiom. Notwithstanding this persuasion, however, I was far from believing Orfyreus capable of making such a discovery, looking upon it as an invention not to be made (if ever) till after many other previous discoveries. But since I have examined the machine, it is impossible for me to express my surprise.

The inventor has a turn for mechanics, but is far from being a profound mathematician, and yet his machine hath something in it prodigiously astonishing, even though it should be an imposition. The following is a description of the external parts of the machine, the inside of which the inventor will not permit to be seen, lest any one should rob him of him of his secret. It is a hollow wheel, or kind of drum, about fourteen inches thick and twelve feet diameter; being very light, as it consists of several cross pieces of wood framed together; the whole of which is covered over with canvas to prevent the inside from being seen. Through the center of this wheel or drum runs an axis of about six inches diameter, terminated at both ends by iron axes of about three quarters of an inch diameter upon which the machine turns. I have examined these axes, and am firmly persuaded that nothing from without the wheel in the least contributes to its motion. When I turned it but gently, it always stood still as soon as I took away my hand; but when I gave it any tolerable degree of velocity, I was always obliged to stop it again by force; for when I let it go, it acquired in two or three turns its greatest velocity, after which it revolved for twenty-five or twenty-six times in a minute. This motion it preserved some time ago for two months, in an apartment of the castle, the doors and windows of which were locked and sealed, so that there was no possibility of fraud. At the expiration of that term indeed his serene highness ordered the apartment to be opened, and the machine to be stopped, lest, as it was only a model, the parts might suffer by so much agitation. The landgrave being himself present on my examination of this machine, I took the liberty to ask him, as he had seen the inside of it, whether, after being in motion for a certain time, no alteration was made in the component parts; or whether none of those parts might be suspected of concealing some fraud; on which his serene highness assured me to the contrary, and that the machine was very simple.

You see, Sir, I have not had any absolute demonstration,

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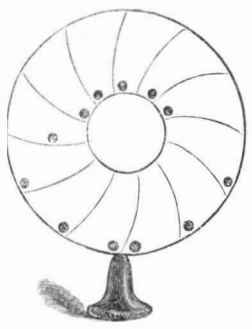
that the principle of motion which is certainly within the wheel, is really a principle of perpetual motion; but at the same time it cannot be denied that I have received very good reasons to think so, which is a strong presumption in favor of the inventor. The landgrave hath made Orfyreus a very handsome present, to be let into the secret of the machine, under an engagement, nevertheless, not to discover, or to make any use of it, before the inventor may procure a sufficient reward for making his discovery public.

I am very sensible, Sir, that it is in England only the arts and sciences are so generally cultivated as to afford any prospect of the inventor's acquiring a reward adequate to this discovery. He requires nothing more than the assurance of having it paid him in case his machine is found to be really a perpetual motion; and as he desires nothing more than this assurance till the construction of the machine be displayed and fairly examined, it cannot be expected he should submit to such examination before such assurance be given him. Now, Sir, as it would conduce to public utility, as well as to the advancement of science, to discover the reality or the fraud of this invention, I conceive the relation of the above circumstances could not fail of being acceptable.

Partington, in his "Manual of Natural Philosophy," endeavors to interpret the somewhat enigmatical specification of the Marquis of Worcester by the following diagram, which it is self-evident almost at a glance can have no movement except that derived from external forces.

Fig. 5.



Making a long jump from the remote to the near, we shall next present an illustration of a perpetual motion machine, invented by Horace Wickham, Jr., of Chicago, Ill., and on which a patent was obtained July 26, 1870. Mr. Wickham will thank us for placing him in such honorable company as the Marquis of Worcester, and our readers will perhaps be glad to see the form and essence of a machine, which Western journals have greatly lauded as most wonderfully ingenious, etc., though if they can see how it generates any motive power, their mental vision will be superior to ours.

A is the bed or table upon which the standards for supporting different parts of the machine are secured. B B are the standards for supporting rocking beam, C. This rocking beam is pivoted at the center to the standards by the ring, D, and set screws. These centers have points like lathe centers. The other parts of the machine consist of a governor, fly wheel, etc.

C is the rocking beam, constructed in two parts and secured together by the bands, E. The rocking beam consists of two tubes; the upper one is made straight, and the lower one in the form of a W. These tubes are connected together at their ends in such a manner as to allow the ball used to pass from the lower tube to the upper one, by means of hinged inclined run-ways, F, and valve, G, and from the upper one to the lower, inside of the band, E", by the opening therein. The inclined run-way, C, is hinged at one end to the upper tube, F', at the bottom of its opening or exit, inside of the band, E', while the other end rests on the valve, C'.

This valve has attached on its under side, a pin which projects down through a hole in the band, E, a sufficient distance, so that, when the pin strikes the standard, H, secured to the bed or table, as the rocking beam oscillates it will raise the valve a short distance above the upper tube. The valve is made to incline toward the opening in the upper tube, so that the ball, when raised on the valve, will roll into the same, by means of the hinged inclined run-way, F. I is a ball, which runs in the upper and lower tubes; this ball is charged with a necessary amount of quicksilver, for giving more weight to the same, and also for giving a much quicker momentum to the ball. This ball is to be used in the rocking beam for the purpose of unbalancing, and also to exert the pressure of its specific gravity on the same at whatever point or position it may be in, and in so doing it assists in oscillating it.

The pitman, J, connects the crank shaft with the oscillating beam. The rocking beam is provided, on the opposite end to which the pitman is attached, with a rod, on which is placed an adjustable weight, which is secured at any desired point by means of a set screw. This weight is for the purpose of counterbalancing the adjustable band provided with a rod to which the pitman is attached, and also the pitman.

The governor is for the purpose of regulating the motion of the machine, and is operated through the medium of a gear wheel on the crank shaft, and other suitable gearing. The governor is constructed in the usual manner, excepting in using the cut-off valve, as in steam engines, which is dispensed with, and an automatic break is used and operated by means of the rise and fall of the governor balls. The automatic break consists of an elastic band, one end of which passes up through a hole in the guide rod projecting from the standard that supports the governor, and is connected to an arm projecting toward and partly around the upright shaft of the governor.

The tension of the band is regulated by nuts and screw-thread on the end of the band. The other end of the band passes under a wheel on the shaft, K, and is secured to a projecting arm on the standard that supports the governor. The crank shaft is counterbalanced.

I do not wish to confine myself to the precise construction of the rocking beam, as shown and described, as I intend using, in lieu thereof, wires, or rods, arranged in the form and shape of the rocking beam described, with mounted weights arranged to roll on them, which, in connection with the other parts of the machine, will accomplish the same result.

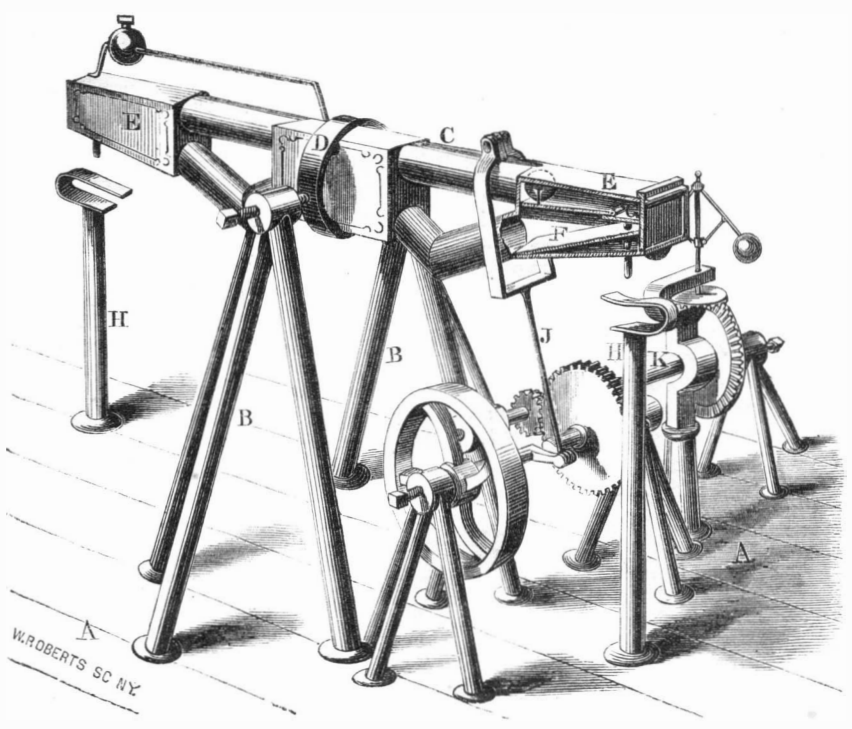
The lower tube can be made semicircular in form and shape instead of the form and shape of a W. Any number of rocking beams may be used, and more than one ball can be used in the rocking beam, by having inclined run-ways and valves on each end of said beam; the rocking beam so arranged that the balls drop from one tube to the other at the center of the of the beam, and rolling alternately from the center to the ends of the beam.

The rocking beam is oscillated by any power operating alternately on each end of the same, and which transmits motion to the other parts of the machine through the medium of the pitman and crank shaft, and for applying power to any other machine a pitman is secured on the opposite side of the rocking beam to which the pitman, J, is attached, or, instead thereof, pulleys, and endless belts on the shaft, K, or the crank shaft.

The spokes of the fly wheel are charged with quicksilver, for the purpose of giving weight to the same at any desired point, as it passes from the center to the circumference of the wheel.

It is claimed that this machine has run seven months without stopping, independent of any external force, which we do not believe, and we think our readers, after reading the above description of it, abstracted from the specification on file in the Patent Office, will concur with us in our belief.

Fig. 6.

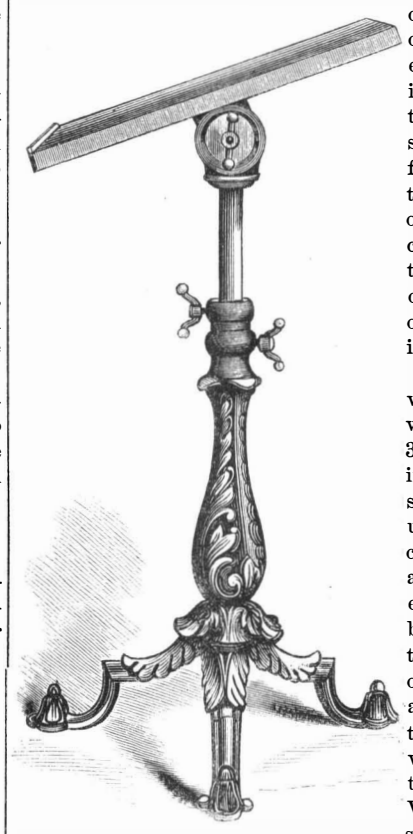


Wire Rope Bridges.

At a recent meeting of the Institution of Mechanical Engineers, held at Birmingham, a paper was read entitled "Description of a Wire-Rope Bridge, at Landore Steel Works, for conveying Materials across a Navigable Stream," by Mr. William Hackney, of Swansea, England. This bridge has been erected as an inexpensive means of removing the spoil from excavations made in carrying out an extension of the Landore Siemens Steel Works, near Swansea, and depositing it on the low marshy ground at the other side of a navigable stream, which runs by the side of the works; and it was a necessary condition that any structure thrown across the stream should be arranged so as not to interfere with the passage of vessels. The bridge is constructed of a pair of steel wire ropes, stretched alongside each other across the stream, and sloping downwards from the higher bank on which the works are situated, to the lower ground on the opposite side, where the spoil is deposited. On each rope travels a runner, or small carriage mounted on a pair of grooved wheels, from which the trucks are suspended by chains; and the two runners are connected together by an endless wire cord passing round a pulley on each bank, so that the loaded truck running down from the higher bank on one of the ropes draws up an empty truck from the lower bank on the other rope, the inclination of the ropes being sufficient for this purpose; the speed is regulated, if necessary, by a brake upon the cord pulley. The ropes are strained over abutments on either bank, and attached by chains to anchorages in the ground; and in order to admit of the passage of vessels in the stream, the abutment on the upper bank is constructed of a timber framing mounted on wheels, which can be run forwards through a sufficient distance to allow of the wire ropes being lowered to the bottom of the bed of the stream, so that the whole bridge is then completely out of the way of passing vessels. For raising the bridge again, the movable abutment is drawn backwards by a hand-winch, until the ropes are hauled up nearly tight; the hauling chains are then hooked to the anchorages by screw couplings, by which the ropes are finally tightened up, and the hand-winch is thus relieved from all strain during the working of the bridge. In this way the bridge is raised into its working position in the course of a few minutes by a couple of men at the upper end. Owing to the curve in which the wire ropes hang, their inclination is steepest close to the upper bank, thus retarding the speed of both trucks as they approach the landings on either bank, and serving generally to stop them without the use of the brake. This bridge has now been in constant use for several months, and has proved very satisfactory for the special purpose for which it was designed.

Adjustable Stand for Draftsmen.

We herewith illustrate a stand which meets a want long felt by draftsmen and artisans. It consists of a table which can be readily and conveniently adjusted to any hight and inclination, easily turned to bring either side of the work in front, and, at the same time, be substantial, ornamental, and cheap: It is made entirely of iron, except the top, which is of wood, 20 by 22 inches.



The stand complete weighs 55 lbs., and will support a board 3 by 4 feet without inconvenience. The spindle which slides up and down in the column can be raised and lowered with ease, and held firmly by the set-screw on the right. The screw on the left immediately above passes through the collar which turns on the top of the column. When this screw is set up, and the others turned back, the top of the stand can be easily turned as the convenience of the workman requires. By means of the hand nut immediately under the board, the work is set at any inclination. It is but a minute's work to adjust it for standing or sitting, which is very desirable for the comfort of artists. It is mounted on casters, and its tasteful appearance makes it equally desirable in the office, counting-room, library, or sitting room.

Manufactured only at the Washburn Machine Shop connected with the Free Institute of Industrial Science, Worcester, Mass. Address, for further information, M. P. Higgins, superintendent.

Repairing the French Atlantic Cable.

The steamship *Robert Lowe*, belonging to the Anglo-American and French-Atlantic Telegraph Companies, returned to the Thames a short time since, after repairing the American section of the French-Atlantic cable. This work was not done by Captain Blacklock without experiencing several difficulties. The exact position of the cable was not accurately marked on the chart, because the faulty portion had been laid in a thick fog. After dragging for it for some time, it was however hooked, and found to be in good electrical condition to St. Pierre; the fault was shown by the electrical tests to be twenty-five miles off, in the direction of Duxbury Beach. The St. Pierre end was buoyed, and then Captain Blacklock proceeded to wind in the cable with the picking-up machinery. After about twenty miles had been brought on board, a ship's anchor came up attached to the cable, and to free it from the anchor the cable had to be cut.

The picking-up was then proceeded with, and at last the fault was reached. At the faulty part the cable had been wilfully damaged and hacked, probably by some captain who had hooked it with his anchor, and had damaged it in freeing his ship. At the time the fault was reached, the barometer fell, and it was plain that a storm was at hand. The end of the cable was therefore buoyed, and soon the storm was felt in all its force. One of the boats was swept away, and the men on the deck were frequently up to their waists in water. It was some days before the weather moderated sufficiently to permit the cable repairing operations to be resumed. The buoy could not be seen, but the cable was grappled once more, the splice made, the cable on board paid out, and the St. Pierre section reached. Then another splice was made, and the loop of the repaired cable dropped overboard.

Capt. Rowett, at the late meeting of the British Association, read a paper on Ocean Telegraph Cables, the object of which was to show the superiority of hemp over metallic cables. He contended that hemp cables were much lighter, and extremely enduring when submerged, and iron cables were quickly corroded by the action of the sea water. Various specimens of submerged cable were exhibited by the author, in support of his views.

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Improvement in Bridle Bits.

This invention consists in making the cheek pieces by which the bit is hung to the cheek straps, independent of the bit, to a certain extent, so that the latter may be rotated in the horse's mouth to bring the curb chain to bear upon the jaw without moving the cheek pieces. Also in placing small metal rollers on the bit, to prevent the horse from seizing the bit in his teeth.

A in the engraving represents the bit, and B the small metal rollers. The side pieces, C, have square holes in them by which they are fastened upon the ends of the bit. The extremities of the bit outside the square shoulders, are cylindrical, and upon these cylindrical portions are loosely placed the lower ends of the cheek pieces, D, where they are retained by nuts, spaces wider than the cheek pieces being left between the nuts and side pieces by means of which the bit and side pieces are allowed to freely rotate.

The spaces are partially closed by flanges projecting from the side pieces and inclosing the lower ends of the cheek pieces, with the exception of a recess in which the side pieces rotate. This arrangement enables the rider to tighten the curb, without interfering with the cheek pieces

The bit is more particularly designed for cavalry use, and is the invention of Col. Thomas B. Hunt, Quartermasters' Department, Austin, Texas.

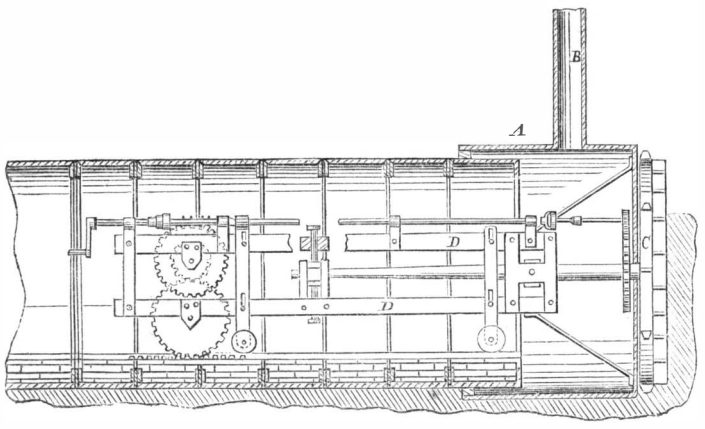
Patented in France through the Office of the Scientific American.

Important Patent Decision.

In the United States Circuit Court, Judge Blatchford has granted an injunction in the important suit of Isaac P. Frank against Charles F. Jacobson and Charles E. Mabie (known as the United States Refractor Company), in which great interests are involved, restraining the defendants from infringing on the plaintiff's patent for glass-lined reflectors, such as are used for lighting stores, churches, theaters, and public buildings generally.

TUNNEL EXCAVATOR.

Our engraving illustrates an appliance for excavating tunnels, patented by Theodore A. Fisher and Anson F. Fisher, of Beardstown, Ill. It consists of a sliding coffer, A, provided with an excavating disk, C, supported by a car, D, arranged on a suitable way in a cast-iron tube. By means of suitable gear the excavating disk is kept advanced to its work. Those familiar with the excavation of the tunnels by the use of coffers, will need no further description to understand the general principle of the device, which is designed to lay submarine tunnels, the cast-iron tubing to be laid in sections as the work proceeds. Air is supplied to the coffer through the tube, B.



Manufacture of Champagne.

As the greater part of the champagne country has been overrun by the German army and the exportation of genuine wine can hardly take place for sometime to come, the artificial production of this beverage is likely to receive a new impulse. For those who prefer to manufacture their own champagne we append a number of approved recipes:

8 Parts of the best West India sugar are to be dissolved in 4 quarts of distilled water, and boiled, and while still hot, 2 quarts of rectified spirits added. This affords what is called champagne liquor to serve as stock in the manufacture.

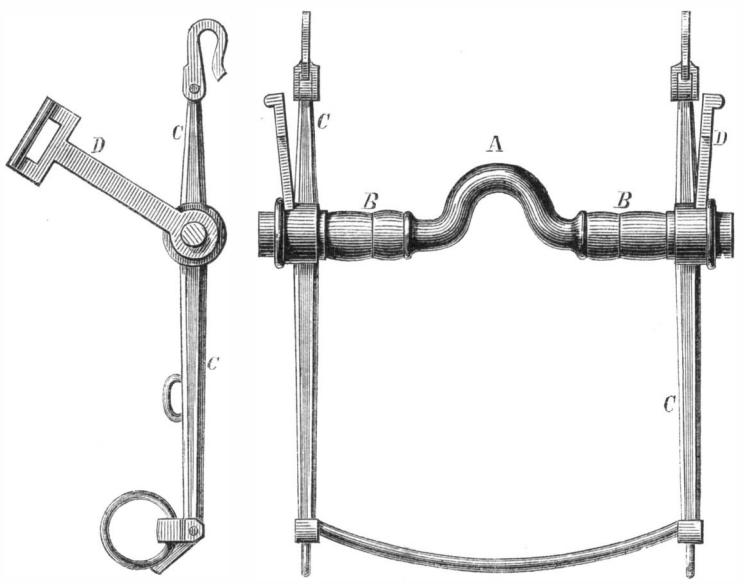
To prepare the Roedern brand with green seal and bronze cap, take one portion of the above liquor, 1 anker white wine, 1 bottle cognac, and 4 drops of the oil of wine beer dissolved in cognac.

For Heidsick, 1 portion liquor, 1 anker white wine, and ½ quart cognac.

Other varieties are prepared in a similar way, the chief difficulty being to provide the proper bottle, sealing-wax, and labels. In default of white wine, cider is found to answer every purpose, and glycerin can be substituted for sugar.

Plaster Casts of Natural History Objects.

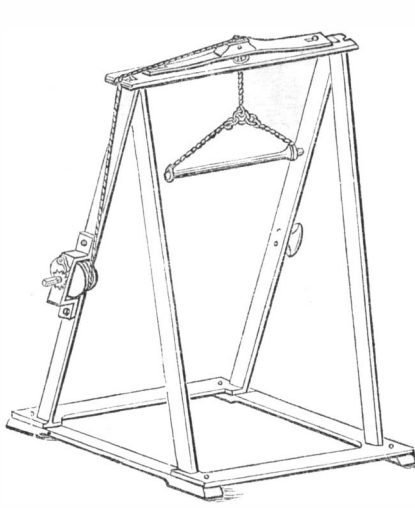
At a recent meeting of the Manchester Philosophical Society, Mr. Boyd Dawkins, F. R. S., exhibited a number of casts in plaster of Paris, of various objects of natural history, and explained the process by which any one can make them for himself. The material of the mold is artists' modeling wax, which is a composition akin to that which is used by dentists. And as it becomes soft and plastic by the application of heat, though in a cold state it is perfectly rigid, it may be applied to the most delicate object without injury. As it takes the most minute markings and striations of the original to which it is applied, the microscopic structure of the surface of the original is faithfully reproduced in the cast. The method is briefly this: 1. Cover the object to be cast with a thin powder of steatite, or French chalk, which prevents the adhesion of the wax. 2. After the wax has become soft, either from immersion in warm water or from exposure to the direct heat of the fire, apply it to the original, being careful to press it into the little cavities. Then carefully cut off the edges of the wax all round, if the under cutting of the object necessitates the mold being in two or more pieces, and let the wax cool with the object in it, until it be sufficiently hard to bear the repetition of the operation on the uncovered portion of the object. The steatite prevents the one piece of the mold sticking to the other. The original ought to be taken out of the mold before the latter becomes perfectly cold and rigid, as in that case it is very difficult to extract. 3. Then pour in plaster of Paris, after having wetted the molds to prevent bubbles of air lurking in the small interstices, and if the molds be in two pieces it is generally convenient to fill them with plaster separately before putting them together. 4. Then dry the plaster casts, either wholly or partially. 5. Paint the casts in water colors, which must be fainter than those of the original, because the next process adds to their intensity. The delicate shades of color in the original will be marked in the cast by the different quantity of the same color which is taken up by the different textures of the cast. 6. After drying the cast, steep it in hard paraffine. The ordinary paraffine candles, which can be obtained from any grocer, will serve the purpose. 7. Cool and polish the cast by hand, with steatite. The result of this process is far better than that obtained by any other. The whole operation is very simple, and promises to afford a means of comparison of natural historys pecimens in different countries, which has long been felt to be a scientific need. Casts of type specimens may be multiplied to any extent, at a small cost of time and money, and are as good as the original for purposes of comparison, and almost as hard as any fossil. Mr. Dawkins has employed it for copying flint implements, fossils, and bones and teeth, which can scarcely be distinguished from the originals.



HUNT'S BRIDLE BIT.

EXERCISING APPARATUS.

A portable apparatus for gymnasiums and private use, and which combines the horizontal bar with the swing, is shown in the accompanying engraving. It is the invention of Geo. W. S. Hall, of Baltimore, Md. On the upright of the frame is a device for taking up or letting out the rope, which latter passes over a pulley hung in the middle of a spring, and descends to support the bar, as shown in the engraving. The whole can be taken in pieces for transportation, and easily set up for use when wanted. The utility of apparatus of this kind to those leading sedentary lives, has not been hitherto properly appreciated by the American public, but we are glad to say that the disorders which our general lack of proper muscular exercise has entailed upon a large class of our population are gradually teaching us its value.



SIEMENS' PYROMETER.

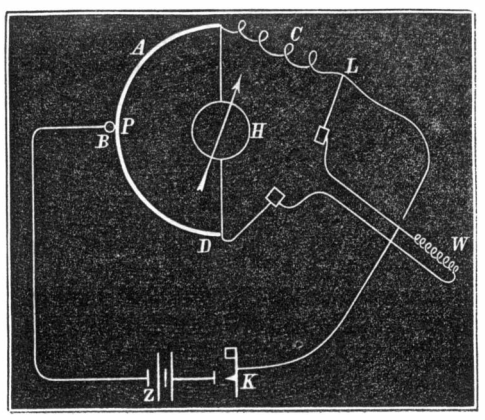
[Condensed from The Mechanics' Magazine.]

This instrument can be used to indicate high temperatures, such as those met with in blast furnaces; it can also be used to measure moderate temperatures, but its chief feature is that the indicating part of the apparatus may be several yards, or miles even, away from the place of which the temperature has to be ascertained. Hence it was used by Dr. Carpenter to learn the temperature of the deeper portions of the Atlantic, and it enables ironmasters and colliery proprietors to see in the office of the works the temperature of their pits or furnaces which are at a distance from the place of observation.

The principle of the instrument is simple. When a plati-num or iron wire rises in temperature it offers more resistance than before to the passage of a current of electricity. Hence the variations in the conductivity of the wire serve to indicate the variations in temperature, which variations may be read off by means of suitable galvanometric appliances.

The apparatus for indicating high temperatures, such as those of furnaces, consists in a coil of fine platinum wire wound round a cylindrical clay pipe, which pipe is about 3in. long by ½in. in diameter. The wire lies in a spiral groove made upon the surface of the clay cylinder; this grooving prevents the convolutions of the platinum wire from touching each other, in consequence of which the electrical current must pass along the whole length of the wire, or about three yards. The exact length through which it must pass is regulated by a small platinum adjusting clamp, the position of which may be shifted. In this way all the instruments made by Mr. Siemens are adjusted to give the same indications. The ends of the fine wire which measures the temperature are connected with two thick platinum wires, each about 18in. long; as the further ends of these thick wires are at a tolerable distance from the source of heat when the instrument is in use, they in their turn are connected with thick copper conducting wires. All these wires are protected by clay pipes. The whole of this arrangement is placed in a protecting tube of iron about 4ft. long. The platinum spiral pyrometer is then in the closed end of the tube; the other end of the tube has a wooden cap on which two brass terminal screws are fixed, and these screws are connected with the conducting wires to and from the spiral.

When temperatures above the melting point of iron have



to be measured, the end of the tube which is subjected to the heat must be made of platinum. In some instances, where moderate furnace temperatures have to be measured, the end of the tube may be made of copper. The metal is very thick at a point some few inches nearer the cold end of the pipe than the platinum spiral, in order that the cooler part of the outer pipe may not draw off the heat by conduction too rapidly, and thus affect the reliability of the indications. The short clay cylinder carrying the platinum spiral has a projection at each end, which prevents any part of the spiral touching the sides of the iron pipe, and thus interfering with the accuracy of the indications by increasing the electrical conductivity of the whole arrangement.

When the end of the great metallic pipe is pushed into a furnace, the temperature of the platinum spiral rises and its electrical conductivity consequently decreases; the decrease in conductivity is measured by electrical appliances, and thus the temperature of the furnace is read off.

Conducting wires are connected with the terminal screws at the cold end of the iron pipe, and thus the hot spiral becomes a part of the electrical circuit. The change in the electrical resistance is then measured by apparatus, the principle of which may be explained by the aid of the accompanying diagram.

The current goes from the zinc pole of the battery, Z, to the movable contact wheel, B, which wheel may be moved to any part of the arc, A D, which is a very fine platinum wire fixed round the edge of a disk of ebonite. When the little wheel is in the position shown in the diagram, the current enters the platinum wire at P, and splits into two parts, one portion of the current going to A, and the other to D. Midway between A and D, the galvanometer, H, is fixed. From the two ends of the platinum wire, A D, the current passes on one side into the constant resistance, C, and at the same time into the galvanometer; on the other side it passes to the other terminal of the same galvanometer, and at the same

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time to one of the leading wires of the platinum spiral pyrometer, W. The current passes through the platinum spiral as well as through the constant resistance, C, and the two branches meet at the point, L, in order to return to the other pole of the battery. K is a "key" for making contact with the battery. As long as the electrical force at A and D is equal, the galvanometer needle will be at rest, but when it is unequal the needle is deflected. The balance may be restored and the needle brought back to zero by shifting the wheel, B; hence, when the electrical balance of forces is disturbed by the heating of the spiral, W, it may be restored by shifting the wheel, B, consequently the temperature is read off by noting the position of the wheel, B, upon the graduated arc, A D.

The plan of action is to expose the platinum spiral to the temperature to be be examined, and to connect the leading wires with the terminals; then the astatic needle of the galvanometer has to be adjusted, so that it points to the zero of ts small scale. When the contact key, K, is pressed down, the needle is deflected, and the movable contact wheel, B, is shifted until equilibrium is obtained. After this, a reading of the large scale on the arc, A D, is taken, and a calculated table attached to the instrument gives the real degrees in Centigrades of the heat of the platinum spiral in the furnace. Many of the instruments are made to register temperatures up to 1,000° Centigrade, and some have been made to register 2,000°, but in these instances, the end of the large tube was made of platinum.

For ordinary temperatures, or temperatures much below a red heat, a fine insulated iron wire, several miles in length is used, and it is inclosed in a hermetically closed tube, that it may be removed from the influences of moisture and rusting. Such thermometers are found to be very sensitive, and to give very accurate readings.

Some of these pyrometers are now in use in the Imperial Ironworks in Russia; they are also used for blast furnaces, and in gas works, for the temperature at which coal is distilled much influences the quality of the gas. Some of the instruments for testing low temperatures have gone to Turin for experimental purposes.

DR. DOREMUS ON THE TRIUMPHS OF SCIENCE.

THE LENS AND THE PRISM.

The first of a course of four lectures at the Hall of the Young Men's Christian Association, on "The Triumphs of Science," was delivered on the evening of December 1st by Professor Doremus.

The lecturer in opening his address alluded in strong terms to the feeble interest manifested by the wealthy citizens of New York in regard to scientific education and the want of pecuniary aid felt by colleges and scientific institutions in general, and made an earnest appeal to all public scientific lecturers to urge the claims of these institutions with greater confidence and energy as opportunity shall offer.

He then announced the subject of the lecture for the evening as the Lens and the Prism, as through these simple yet powerful instruments a very large proportion of "the triumphs of science" have been achieved.

He first briefly sketched the history of the development of knowledge with regard to celestial objects. Strange to say, although we had such perfect records of the workings of the human mind in other fields, we did not know the authors of some of the grandest achievements in connection with astronomy. Naturally, we should conclude, the first object of attention would be the sun, and the second the moon. These were evidently the means of indicating to us the hours of the day. "To every nation, tongue, and clime, each in its meridian, the eternal sun strikes twelve at noon, and the glorious stars, far up in the everlasting belfry of the sky, chime twelve at midnight." As a time measurer the sun was the first object of attention. It was then probably observed that the shadow of the sun lengthened and shortened, and thus we had two periods of the year—the period of the longest and the shortest day. Next came the observation of the moon, and then of the stars—their movements, magnitude, and grouping, especially those constellations through which the sun and moon passed.

The Professor then detailed the various discoveries made by Pythagoras, Copernicus, Galileo, and Kepler, saying in regard to the latter that astronomers of all lands had agreed in awarding him the proud and well-earned title of law-giver of the heavens. His discovery of the elliptical movement of the planets was one of the greatest achievements of science, In regard to Galileo the lecturer said: "Let us not forget the painful termination of his splendid career, and the extraordinary and infernal vice of the human brain to humiliate this great champion of truth, who, though assured of the reality of the revolution of the earth, was obliged, upon his knees, and with his hand upon the sacred Scriptures, to swear the earth did not move. I have never seen a more infernal vice in history."

The lecturer then advanced to the discoveries of Arago, and Leverrier, and gave several instances of the marvelous accuracy with which mathematics had been applied to astronomy. In 1846 Leverrier predicted the locality where the new planet that had been previously observed, and had then disappeared, ought to shine, and his friend in Berlin examined the firmament on the night announced, and lo! there the new world was found. Dr. Doremus concluded this portion of his lecture by showing how vividly the discovery that our whole solar system revolved round a sun (which some had supposed to be Hercules), which again in its turn, with its attendant systems, rotated round yet another central sun, mpressed us with a sense of the boundlessness of the univierse

His remarks on the prism consisted chiefly of a clear and interesting explanation of spectrum analysis. He said that probably the prism would prove even more fertile as a means of discovery than the lens. Several new metals had already been discovered by its aid, and we had now something like proof as to the real nature of the sun, which probably consisted of metals in a highly incandescent state.

The lecture was illustrated by many brilliant and interesting experiments. He gave among others the well-known experiment of a body of oil suspended in a globe of alcohol and water, which, upon being moved upon an axis, gradually threw off bodies of eccentric forms. The motions of the universe and the results of spectrum analysis were displayed by the aid of a series of dissolving views, which were of a highly entertaining and instructive character.

Correspondence.

The Editors are not responsible for the opinions expressed by their Correspondents.

Automatic Telegraphy.

Messrs. Editors:—In your issue of November 5th, is an article upon the subject of "Automatic Telegraphy," by George B. Prescott, Esq., in which occurs this passage:

"In order to attain the exceptionally high rate of speed which has been experimentally obtained upon the Automatic line recently constructed between New York and Washington, the Company put up a steel and copper wire for which they paid more than three times the cost of a good iron wire, suitable for the use of the systems in general use. It is evident, therefore, that even the claim for greater economy in the construction of their lines, which has been so frequently made by the advocates of that system, is not well founded."

Let us see if this be so. The National Company, referred to by Mr. Prescott, have used the American compound telegraph wire, in the construction of their line to Washington. This wire is composed of 80 pounds of steel and 80 pounds of copper to the mile, its total weight per mile is therefore 160 pounds, but its conducting power is equal to that of an iron wire weighing 630 pounds per mile, and its cost per mile was $82. It is erected on an average of about 15 poles per mile, and is insulated by the Brooks insulator.

We will suppose that the posts cost, all set, on an average, $3 each, also that it cost $3 per mile for stringing the wire, and that the insulators cost 38 cents each.

These are among the principal items which go to make up the cost of a line of telegraph. Let us see how they sum up:

1.	Cost per mile of 15 posts set.....	$45·00
2.	" " " " 15 insulators.....	5·70
3.	" " " " wire.....	82·00
4.	" " " " stringing.....	3·00
	Total.....	$135·70

or less than one-half of Mr. Prescott's estimated cost of an ordinary line, call it $150·00 per mile, which will cover the cost of such materials and equipments over most of the length of such a line. Of course the expense of poles suitable for use in large cities, and the cost of setting them in cities would be consideraby above these figures, still the average cost will be less than Mr. Prescott's estimate for an "ordinary line suitable for the systems in ordinary use."

Don't they get the worth of their money?

The line is280 miles in length instead of 228, simply because they were obliged to go upon highways and byways, and it was under great difficulties that they secured a location at all.

Mr. Prescott admits (which is true) that they have attained a speed of 250 words per minute over the 280 miles of compound wire line, and he remarks (which is also true) "that the speed of automatic transmitting varies inversely as the square of the length of the line."

Suppose then that this line could be shortened to 250 miles by going alongside of the railroad for most of the distance, its speed then would be increased in the proportion of the square of 280 = 78,400 to the square of 250 = 62,500, or $\frac{78400}{62500} = 1{\cdot}25$, an increase of twenty-five per cent, thus making $1{\cdot}25 \times 250 = 312$ words per minute.

Mr. Prescott also admits that 100 words per minute were all he could obtain over 250 miles of No. 8 iron wire, in a series of carefully conducted experiments.

If now, with this superior compound wire, the National Company can transmit automatically three times as fast as upon a No. 8 iron wire for the same distance, are they not fully justified in paying three times as much for it? but is $82 three times as much as the cost of a No. 8 iron wire?

We must take into account also that this new compound wire can be put upon 15 poles per mile, and withstand the storms quite as well and better than the Western Union Company's wires do with 38 poles per mile.

Now when we realize that insulation improves inversely as the square root of the number of insulators, we see that the gain in insulation, by using 15 instead of 38 insulators per mile is $\sqrt{\frac{38}{15}} = 1{\cdot}59$, nearly 60 per cent, let alone the saving in cost of construction and maintenance, and by doubling the conductivity only one half of the battery is necessary. The conductivity of this compound wire per pound per mile, is three times that of an iron wire.

Again, since it is admited that the Phelps printer can transmit only about 50 or 60 words per minute, while it will be seen from the above that an automatic system can transmit five or six times as many, now why not employ some kind of an automatic system to transmit the messages, and employ the Phelps, House, or some other printer, to simply copy them, as I suggested to Mr. Craig and Mr. Little last summer, and to several other friends nearly two years since.

Boston, Mass. Moses G. Farmer.

The Man who Built the Telegraph.

Messrs. Editors:—On page 326, Nov. 19 issue of your paper, is an editorial notice of a late meeting of the Western Union Telegraph Company, which is headed "Honors to the Inventor of Telegraphy," containing an abstract from the very appropriate remarks of its President, Mr. William Orton, in which abstract, by an error of one letter (e), the meaning of the President in one sentence is entirely changed. It occurs in the eighth line of the second paragraph, in the word "men," which should have been "man," or as follows: "In the same presence sit to-day, in the annual services of the largest telegraphic organization in the world, the man who made its existence possible, and the man (men) who made it."

Now to whom did Mr. Orton refer as "the man who made it?"

Aside from Professor Morse and one other gentleman, there were none present who contributed either in making the telegraph, or by money for its development, or as an investment in its stocks, for years after its introduction into general use and its necessity as a business agent became apparent and generally acknowledged. By reading the above sentence as corrected and as pronounced by President Orton, it will be seen that it refers to Professor Morse as the man who invented the telegraph, and to Hon. Ezra Cornell, of Ithaca, as "the man who made it." It was Mr. Cornell who took the entire management of building the first line in this country, from Washington to Baltimore, to its completion, and put it into successful operation, after the Professors Morse and Gale, Doctor Fisher, and Messrs. Vail and Smith, had expendetwenty-three thousand dollars of the Congressional approprd ation of thirty thousand dollars, and broken down at the Rei lay House ten miles from Baltimore in the winter of 1843 and 4, in their fruitless attempts to insulate the wires so as to make them work, inclosed in leaden tubes beneath the surface of the earth. As this allusion of President Orton is the first public recognition, small though it may be, of the important services of Mr. Cornell in rescuing the telegraph from the wreck of the failure which had been made by its inventors in their efforts to build their first line, which has ever come under the notice of the writer, he deems it but just and proper that this correction should be made, and asks its insertion in your columns. Horace L. Emery.

Albany, Dec. 5, 1870.

Spiritualism and Science.

Messrs. Editors:—In your last issue appeared an article entitled "Spiritualism aad Science," which is a sort of review of a work by Dr. Hammond. I have not seen Dr. Hammond's work, but from the extracts which you give and the remarks you make—with all due respect to the learned doctor—I must say that he has not only been a partial but a prejudiced observer. My own experience teaches me this. He has endeavored, as many other scientific men have already done, to reconcile the observed facts with scientific laws, has failed, and therefore denounces them as hallucinations.

I do not intend to speak of spiritual visions, communications, and so forth, since these may readily be pronounced impositions, and attributed to diseased conditions of the brain; but it is to table movings and such manifestations, which Dr. Hammond states to be "due to hallucination, legerdemain, or actual fraud," that I intend to call your attention.

He also states that equally wonderful tricks can be performed by any professor of natural magic. Without denying the latter assertion, allow me to add that all such tricks can be detected by a thorough investigation, but I defy any man to detect the least deception in the phenomenon of table tipping. I have seen the experiments performed in private parlors, and under circumstances when I knew there could have been no deception; in fact, have myself been violently thrown to the floor, as a number of ladies and gentlemen who were present can testify, while attempting to prevent a table which was under this influence from moving.

The evidence which can be brought forward to support the existence of this occult science is too weighty to be overthrown by ridicule.

In conclusion let me state that I am not a spiritualist, nor am I in any way connected with any spiritual circle. I have studied the subject with an unprejudiced mind, and am convinced that there is a mystery about it which ought to be solved, and which lies within the scope of science to investigate.

I am aware that these things are in opposition to gravity; I am also aware that by writing this I expose myself to the ridicule of the greater part of the scientific world; but as I have devoted my life to the study of science and truth, I have seen these things and know them to be facts. I hope in this way to call the attention of scientific men to these things, which seem fatal to all the laws of nature. I hope to see them fairly investigated; discarded if they are deceptions, and if not ,attributed to some mysterious power beyond our ken. R. H.

Ithaca, N.Y.

Sanity vs. Insanity.

Messrs. Editors:—Over twenty-one years a regular reader of the Scientific American, I hope the Editors will allow me to be of age, and in sound mind, when I add, that I have every copy well bound, and not a number missing, and prize them next to the Year Book of "Scientific" (Annual) Discovery.

Having dabbled a little with the microscopic, magnetical, and electrical experiments, collected all sorts of weeds, and "livin'" things, and curious about spontaneous generation, surrounding ether, the egg-development, and all that sort of thing—and occasionally written articles for horticultural journals, folks here in this benighted quarter give me credit for

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being a man of science; but, alas! although I have not only read Faraday, Huxley, Owen, and a host of other authors, and been put to heavy expense, as the shelves of my library will testify, to learn something, I have concluded, according to your judgment on these point, that I must be a dyspeptic reader, unable to *digest* what I have read. In your article on "Spiritualism and Science" (p. 360, current volume), you truly say spiritulism s a "subject that scientific men dislike to approach," and you might as well have given the subject a wide berth, and been silent—for your language is too strong—besides it is not true what you say—and your own instincts ought to teach you—when the "rush-light" of science fails to illuminate the chasm yet existing between mind and matter—body and soul—unless you consider the soul of man a myth.

I may say, in order to define my position, that, contrary to to my wishes, I have been chosen as an elder in the Presbyterian Church, I trust, owing to a consistent Christian walk and conversation. I dislike cant or a display of piety. Scientists and spiritualists both reject the atonement and sovereignty of Christ, and deny the necessity of faith in Him, and repudiate the entire Gospel scheme, which I do not.

So coupled, you are nearer akin to the spiritualist's belief than I am. You say "The whole business of spiritualism has been the source of much mischief, and has brought insanity into many a family. OUR readers ought to know, that no man of science, no sane man of intelligence, has any faith in it. Before the light of science the whole thing is shown to be an imposition. 'But,' as Dr. Hammond says, 'Spiritualism is a religion.'" No doubt meaning just as much so as Presbyterians, Lutherans, Episcopalians, etc. Like in early gospel times, Paul had Sadducees and Pharisees to deal with. The Gospel of Christ differed from both.

But "facts are stubborn things;" and what a man, who is thoroughly posted in legerdemain or the hocus-pocus of scientific contrivances, of a cool judgment, and deliberate habit of investigation, sees in his own private dwelling—under full light—with no one present capable to mesmerize him, or possible opportunity of being misled—what such a man sees under such circumstances, require some other mode of explanation than the fancies of the hypochondriac, or that of hysteria, catalepsy, and ecstasy; that is, tables moved without any visible contact or invisible contrivance. I am very curious to read and add to my library, with other sapient authors, the small monogram entitled "The Physics and Physiology of Spiritualism," by William A. Hammond, M.D. If you had mentioned the price and place, I would order a copy at once.

But, my dear sirs, the animus of your remarks do not only bear on "Modern Spiritualism," but all that is not material. You say the consciousness of this great truth (Materialism) weighs like a nightmare upon many of the best minds of these days. These "best minds" watch the progress of "Materialism" in such fear and powerless anger as a savage feels "during an eclipse." "They are alarmed lest man's moral nature be debased by the increase of wisdom."

You altogether mistake at least one class of devout Christians, who take as great pains to increase their wisdom as you could possibly wish. Have you not discovered that there are things beyond the scalpel and analysis of matter to which names are given, that by no means explain these phenomena?

Now tell me, logically, why a common magnet will cause a needle to leap up to it, and will not disturb a pin? They are all inert metallic matter. To call it gravitation or attraction, mind you, will by no means explain it. If you will demonstrate this simple fact, then will I agree that you can explain the difference why a divine influx from the Author of our being can impress some minds, so that faith in a future state of existence is inspired as to lead him joyfully to anticipate that endless state of existence, built up of imperishable refined matter, unalloyed by the crudities of earthly ponderable elements. That mind, on the other hand, who sees that, scientifically, he is continually throwing off matter, which is again absorbed by vegetation, and again received into his physical organism, and all that, until he finally finds the machine worn out and himself "gone to grass"—what a pity—this aspiring mind of man, emblematic of its great author, to lose all individuality, and the substance turn to dust or into the herbage for the ox!

You know the celebrated chemist, Dr. Dalton, who thought the red gown in which he was installed as a Doctor of Civil Law, at Oxford, was a blue one; he was color-blind, could not tell when his blue stockings were exchanged for red ones; they simply seemed a little dirty, to his eye. I might learn some useful lessons in chemistry from such a man, but I would decline his instructions or judgment to discriminate in colors for me. The illustration respecting the introduction of the stereoscope to the *savants* of France (SCI. AMER. p. 322, current volume) is a very apt illustration. Another man's defects in his mental organization, or physical defects, cannot annul the legitimate functions of a proper development, and the cap of a hypochondriac fits one rather than the other.

I am now over sixty-two years of age. I have much to learn yet, no doubt, so have you, my worthy friends. Our mental organisms differ. I can truly believe that "angels could roll the rock from the sepulcher," or give to John a "revelation on the Isle of Patmos," and matters of that kind. Of course, to you such notions are hallucinations. But this so-called hallucination is so indelibly fixed that it makes me a happy, patient, cheerful old man. God be praised! The closet affords such *ecstatic* enjoyment, that the "poor rooters," however profound in a knowledge of organized matter, know nothing of it. The "Lord pity them!" and touch their latent functions, if not wholly dried up in their—heads, I suppose it ought to be, or—hearts, I shall not quarrel about the locality, it is the instinctive feeling that we are not Godless nor soulless creatures, place it where you please.

But all this by no means hinders me from such profound studies as geology, astronomy, and natural and mental philosophy; every fact revealed by these researches I duly appreciate. I do not shrink from perusing an author because he is styled an infidel, because I want to know how or whence he draws his knowledge. I am by no means a timorous Christian. Such is my confidence in Him in whom I believe, that if you were to tell me (beg pardon for mentioning such a personage to scientific ears) that the devil himself was in my back room, and desired an interview with me, I would deliberately "interview him," as politicians say. I hold that "truth is mighty and must prevail," because God is the author of truth, as the devil is said to be the father of lies. But, until this matter is settled what truth is, I beg you will be a little more modest, and not so hurt the feelings of well-disposed searchers after truth, as to consider those who, perhaps, have a "convolution" in their brain, which may be lacking in your own, through which they have a different experience, and come to different conclusions on matters of faith and spirit; allow them to be rational—please do.

Lancaster, Pa. JACOB STAUFFER.

Popular Errors Regarding the Watch.

MESSRS. EDITORS:—Most people suppose the regulator is put in the watch for the use of the watchmaker, when, the fact is, it is principally for the convenience of the owner. The watchmaker does not absolutely need it, some fine watches being entirely without one. It is well known that every individual watch has its own whims and caprices of action—an individuality by which it differs from another of precisely the same construction; some persons have gone so far as to assert that a watch partakes of the character of the wearer, that there is a kind of assimilation between the two; there is no doubt, however, but that the action of the watch is materially and sensibly affected by the habits of the wearer, which fact brings us face to face with the subject of regulation, which should be done entirely by the user of the watch.

This is quite contrary to the general opinion, which is, that it is especially the business of the watchmaker. A customer rushes panting into the shop, exclaiming, "Mr. Pivot, my watch is away behind time—I missed the train by the confounded thing being five minutes too slow this morning, and ever since you have had it, it goes too slow. Now I want you to keep it here till it is right," and he lays it down on the counter with a whack sufficiently hard to do it injury, and with an air which plainly says he is much offended, either with the negligence or want of skill of Mr. Pivot.

"Hold on! hold on!" shouts the watchmaker, as the indignant man is slamming the door after him, "How long is it since I set it?"

"I can't tell; it must have been ten or fifteen days—you ought to know—don't you remember—it was the day you mended my wife's gold spectacles."

"Now, my dear sir," says Mr. Pivot, "do be reasonable; don't you know that I can't exactly regulate your watch hanging here? Neither can I regulate it in your pocket unless I know how long it has been running since last set, so as to know its rate of going. You say ten or fifteen days, which is it? If ten days, it is half a minute per day; if fifteen days, it is only one third of a minute per day. Now how can I move the regulator intelligently on such uncertainty? or how can you expect me to remember when I set it, or when your wife's glasses were mended? for as soon as your watch was out of my hands some other one was in, and in the ten or fifteen days since I moved your regulator I have done the same thing to a hundred others; now don't you see what impossibilities you require of me?"

"Yes; I see how it is, but never thought of it before."

"I knew it," continues Mr. Pivot," and that's the reason I have given you such a plain talking to, and now take your watch, put it in your pocket, and make a memorandum of the date on which it was set; then when you have ascertained its rate of going, move the regulator yourself; the amount of movement it will require to affect it a certain quantity you will soon learn, and as that amount differs in every watch, it becomes necessary to know it in order to regulate it with the greatest nicety, this particular knowledge of every watch, no watchmaker can have. But should you prefer he should move it, never ask him to do it until you can tell him how much it gains or loses in a given time, for it is only troubling him and yourself needlessly, and he will be just as likely to keep your watch perpetually wrong as to ever get it right; that is why I say to you so bluntly, but honestly, if your sight be good and your hand steady, regulate it yourself, but be especially careful to avoid attempting to make your watch agree with every clock you chance to look at, or every watch the owner says will not vary a minute in a year."

Cleveland, O. R. COWLES.

Explanation Wanted.

MESSRS. EDITORS:—A short time since I was walking along the bank of the Morris and Essex canal in this city, when passing a telegraph pole, I was attracted by a queer buzzing noise which came from it. Pressing my ear close against the side, I could hear the sound very distinctly. It seemed to come in little pulsations like a battery. I then went to several other poles, at each of which I heard the same curious noise, though in some it was very faint; while at the first one I stopped at, it was so loud that, by listening acutely, I could hear it at a distance of five feet. By laying the hand on the pole the vibrations could be distinctly felt.

Perhaps some of your many readers can suggest an explanation. F. P. DODGE.

Jersey City, N. J.

Grindstones by the Ransome Process.

MESSRS. EDITORS:—In your issue of the 12th Nov., I notice under the heading of "Artificial Stone" an article by J. E. E. upon grindstones manufactured under the Ransome patents.

J. E. E. represents that though those experimented upon proved fully up to his expectations as a trial; some being "superior stones hard clear through, and doing excellent service," yet others lacked uniformity in hardness; containing spots where the sand had never united.

The tenor of his article is, that if these stones could be produced free from soft spots and of uniform hardness they would far surpass the natural stones in effective working.

My present object is to draw attention to the fact that stones can be, and are produced by the Ransome process free from soft spots, and of uniform hardness, and that, as he anticipates, they far surpass the natural stones in effective work.

The defects alluded to are not—as one would gather from his letter—inherent to the manufacture, but arise from ignorance of its details, or from want of due attention thereto.

The soft spots are occasioned by the imperfect admiture of the materials, and the want of uniformity is due either to the same cause, coupled with imperfect pressing, or to the latter point alone.

The Ransome process, when its details are thoroughly mastered, and correctly carried out, is certain in its effect, and invariably produces the expected results.

San Francisco, Cal. E. L. RANSOME.

The Thermantidote Again.

MESSRS. EDITORS:—I beg to make a few observations with respect to Thermantidote's letter, which appears in the SCIENTIFIC AMERICAN of the 26th ult.

"Thermantidote" appears to have a pretty correct idea of the details of the machine, the appellation of which he has used as his *nom de plume*. The construction of it is precisely similar to that of a fanning mill. The object is the same in both—viz., to produce a strong current of air. In the thermantidote this current is driven through a grass mat, which is kept saturated with water. By this means a great degree of evaporation is caused. Your correspondent is no doubt aware that a lowering of the temperature of the air is a result of evaporation. For the purpose of cooling a room the thermantidote is placed in a doorway with the back part directed inwards.

A common plan to cool houses in India is to open the doors in that side of the house on which the wind blows, and to hang up grass mats saturated with water in the doorways. The natural wind blowing through the mats produces evaporation. The degree of evaporation obtained in this manner is not, as may easily be conceived, equal to that attained by the thermantidote.

It may appear strange, but it is nevertheless true, that by the use of such appliances the warmer the air on the outside of the house the cooler it becomes in the inside of it. The reason is simply the increased evaporation.

I may add that the mat to which I have referred is called in India a "kuskus tatty," tatty being the Hindoostanee for mat, and kuskus that for the aromatic grass of which it is made. DEESA.

London, Canada.

Atmospheric Pressure.

MESSRS. EDITORS:—In the SCIENTIFIC AMERICAN of November 12, page 314, you notice approvingly the statement of a correspondent, A. M. T., that the entire weight of the atmosphere is not sustained by the earth, but is only equal to, or in the ratio of a column of air, one square inch of base, and extending to the outside limit of the atmosphere.

It is singular that, before coming to this conclusion, some disposition of the left out portion should not have been made. The relative amount of this neglected portion would vary with the hight assigned to the atmosphere; but instead of the inch parallelopiped, if we substitute the frustrum of the sector of a sphere, the interior end resting on the said square inch, and the exterior forming part of the atmospheric limit, whether of 10 or 1,000 miles in light, we should have a correct view of the case, and the entire pressure on the earth.

Pittsburgh, Pa. F. W. B.

Ivy Poisoning.

MESSRS. EDITORS:—I send you a prescription which I am satisfied, from ten years' experience, is the very best remedy for ivy poisoning. It is simply to bathe the parts affected freely with *spirit of niter*. If the blisters be broken, so as to allow the niter to penetrate the cuticle, more than a single application is rarely necessary, and even where it is only applied to the surface of the skin three or four times during the day, there is rarely a trace of the poison left the next morning. Having often, previous to the discovery of this antidote, been rendered helpless and blind by ivy poison, I know its worth to those effected thereby.

Port Jefferson, N. Y. H. MARKHAM.

Smoky Chimneys.

MESSRS. EDITORS:—I have had some experience similar to Y.'s (page 340 current volume of your paper) with smoky chimneys, and remedied them by the same means.

I think many flues are built too large, especially in cases where they are intended for stoves, as an ordinary stove cannot heat the whole volume of air, and by this means create a draft.

A stove flue ought to be very little larger in area than the pipe that goes into it—where the flue is perpendicular—where bends occur the area should be increased. A.

Freeport, Pa.

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Improved Mode of Graining Wood.

The object of the improvement herein described, and of which our engraving gives a good representation, is to facilitate and cheapen the process of graining, so that instead of, as now, requiring for its adequate performance skill acquired by long practice, it may be performed by the comparatively inexperienced more rapidly than it can be done by the most skillful under the old process.

Hitherto the operation of graining has been tedious, laborious, and expensive. It is claimed, however, for this method that at least four times as much work can be performed by its use as could be done heretofore, while the quality of the work is fully equal to the best hand graining.

The operation is performed by the aid of stencil plates, shown at the right hand lower corner of the engraving. The engraving also shows the method of applying the plates, as described below.

These plates can be cut in any desired style of graining from natural woods, by taking off the exact pattern of the grain on tracing paper, transferring the same to the plate, and cutting the plate after the pattern thus traced. All the woods now used on account of their beautiful pattern of graining may be thus copied by the use of the plates. The whole is finished in quantity by the use of the steel fine comb, the teeth of which are covered with graining cloth, and then drawn over the plate several times while the latter is held by one hand firmly against the door or wainscot to be grained. Various portions of the plate may be used at intervals, to make variety of pattern, so that with one panel plate a number of doors may be made entirely different from each other. All the designs in the various plates are made to match each other at any section, and the entire plates also match, so that endless variety of pattern may be secured. Thus tame repetition is avoided.

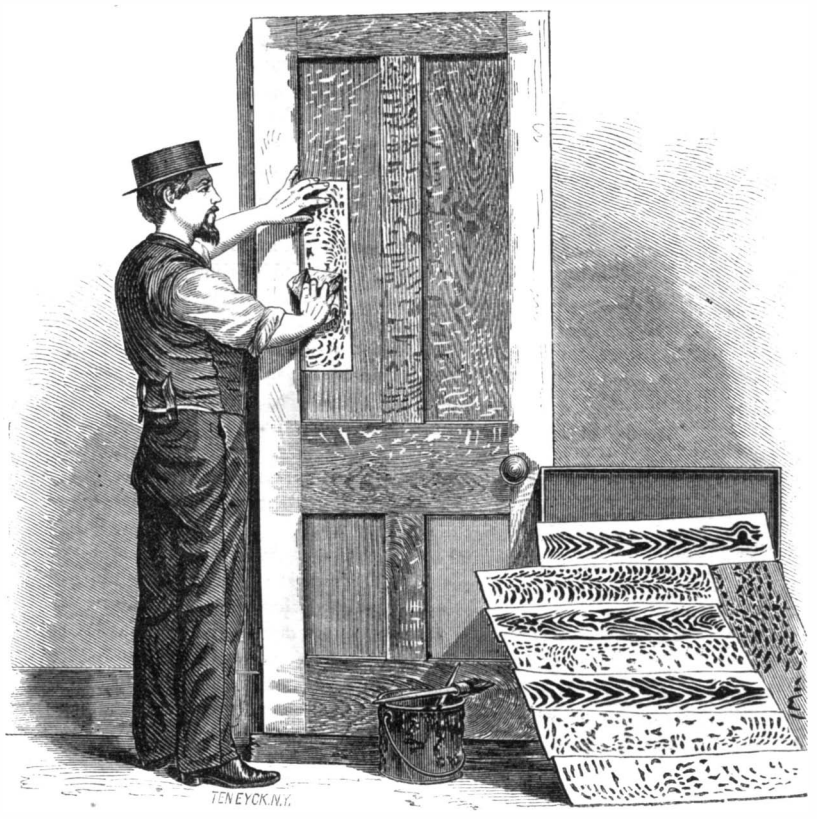
A full set of stencil plates for this purpose numbers ten or more in making the various patterns and to perform graining in any place large or small.

The stencil plates are made of brass, steel, or other suitable metal. In these plates the desired pattern is cut, and the surface is indented or covered with a series of small bosses, formed by indentations on the opposite side, so that when placed on the surface, and the plates are wiped or brushed, as hereinafter described, those portions of the paint not desired to be removed shall remain undisturbed for subsequent treatment.

These plates are held stationary during the operation by small steel pins at the corners. The operation is as follows: The desired graining color is first rubbed in. Then the proper plates are applied, and held by the pins, as above specified. The plate is then rubbed over with a rubber cloth, or other suitable pad, which penetrating the openings in the plate and removes the graining color lying underneath the cut pattern. The plate being then removed, the work is completed with the ordinary graining tools.

The inventor of this method informs us that he took the first premium at the Northern Ohio Fair, both for superiority of work and for the method of performing it.

Patented, through the Scientific American Patent Agency, July 5, 1870, by John J. Callow, of Cleveland, Ohio.



CALLOW'S METHOD OF GRAINING WITH STENCIL PLATES.

Improved Flexible Joint for Water Mains.

The accompanying engraving shows a flexible joint used in laying 789 feet of 10-in. cast-iron pipe, which has just been completed and laid on the bottom of the eastern branch of the Ohio River, at Wheeling, West Virginia.

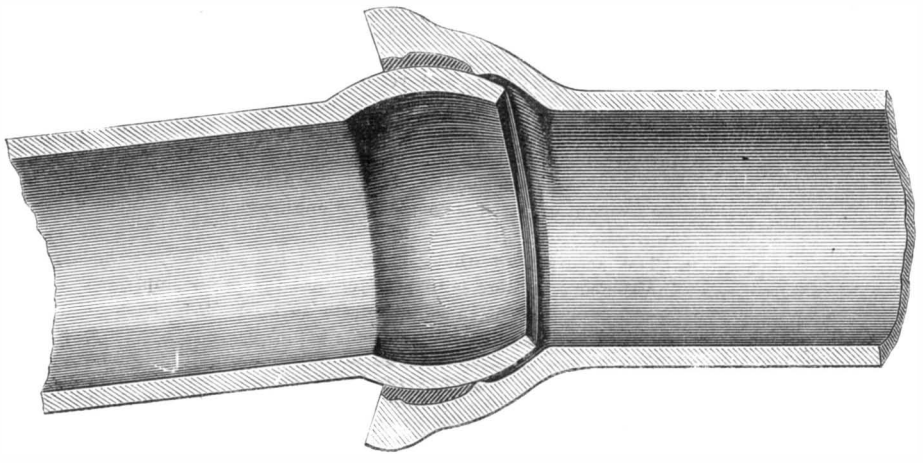
This joint was patented, through the Scientific American Patent Agency, March 15 and May 31, 1870, by Mr. Robert B. Coar, of the Jersey City Water Works, and is very simple in construction, employing neither bolts nor loose parts.

The spigot, or ball, is made of the exact size to enter the faucet or bell, the space for lead packing being formed when the center of the spigot passes through the mouth of the bell, and of a wedge shape which, when packed, cannot be drawn out or displaced.

This joint was run and calked in the ordinary manner to compensate for the shrinkage of the lead. The spigot being turned to the radius of a true circle will adjust itself to any unevenness. There was no difficulty in laying the pipe, although the current in the river was four miles per hour.

Each joint was made separately, inspected, and passed from the boat into the river to adjust itself on the bottom. When laid, the pipe was tested under a head of 200 feet by the Superintendent and Committee on Water Works of the city, and proved satisfactory in every respect.

In pipes of large diameter, Mr. Coar has provision for an inside joint by which a double joint can be made on all pipe under water. The laying of conduit pipe in this manner dispenses with viaducts in crossing rivers, and does not interfere with their navigation, which must be a great saving to water companies and corporations, who are obliged to cross streams and rivers in carrying out their plans of distribution. The principle may be extended to pipes of any diameter designed to be used as tunnels as well as water mains. Address for further information Robert B. Coar, Jersey City Water Works, Jersey City, N. J.



COAR'S FLEXIBLE JOINT FOR WATER MAINS.

Cyclones.

John M. Crady, Curator of the Museum of the College of Charleston, S. C., writes to *Nature* as follows:

Cyclones are commonly regarded as exceptional phenomena of the atmospheric circulation; and we see in text-books statements as to the seasons of the year at which they are most apt to occur, descriptions of the premonitory signs which herald their approach, and directions to aid ships in avoiding the most dangerous portion of the storm field. In short, each cyclone is regarded as an exceptional fact, an isolated burst of fury from the old storm-god, Hurakan.

The writer has lived all his life on the great highway of cyclones, at Charleston, S. C.; and from the observations of many years, has been led to conclude that this commonly-received view embraces only those cyclones which, on account of their rotatory violence, really do threaten destruction on land and sea; and that consequently it overlooks a most important series of phenomena, which, though they do not so forcibly arrest attention, are even perhaps more significant in a scientific point of view. Though destructive cyclones or hurricanes are fortunately rare, cyclones or grand rotary movements of the atmosphere are, at least on certain portions of the earth's surface, of every-day occurrence. In Charleston, Savannah, and along the coast of South Carolina generally, the writer knows from experience that very few, if any, changes of wind are to be observed, but such as are due to the cyclone which happens just then to be passing on its northward journey; and even the apparent exceptions are probably not difficult of explanation.

There is, in short, an atmospheric "Gulf Stream," whose course, beginning somewhere eastward of the Caribbean Sea, is nearly the same as that of the oceanic "Gulf Stream," and this atmospheric stream is composed of an endless succession of cyclones chasing each other ceaselessly up towards the polar regions, along the track recognized as that of great hurricanes.

These cyclones vary within very wide limits, both as to velocity of rotation and velocity of translation, as well as in diameter, and all the characters usually ascribed to such atmospheric movements. Many of them exhibit no wind stronger than a pleasant breeze in any part of their field; and a few have so gentle a motion, at least in some parts of their circuit, as will not agitate an ordinary vane; a few are almost wholly without clouds, and very many wholly without rain or lightning. Their effect upon the barometer, when appreciable, must generally be very slight; but in temperature they are usually divided into a warm and a cool semicircle by a line which, in Charleston, lies about S.W. and N.E.

Observations of the winds, during a voyage in a sailing vessel from Charleston to Liverpool, along the course of the Gulf Stream, has satisfied the writer that the stream continues unbroken between these two points, and this conclusion was strengthened by repeating these observations between Liverpool and New York. In the former voyage, hardly one of the cyclones which passed over gave more than a stiff breeze, while in the latter, from Cape Clear to Sandy Hook, every cyclone was a storm, and one of them was reported by the captain, on his arrival, as a "hurricane."

The causes of this aerial current, and its connection with the circulation of the whole terrestrial atmosphere, it is not the writer's purpose at present to discuss, though he considers the discussion one of almost cosmical importance. But the existence of such a stream is a fact of practical commercial value, in fixing the natural highways for sailing vessels between Liverpool and the Atlantic and Gulf ports of the Southern States. Obviously the short route from Northern Europe to those ports will be that southward along the coast of Europe until reaching the trade winds, then westward to strike the cyclone current in the neighborhood of the West Indies, and then, if bound to Atlantic ports, northwestward with that current. When bound, on the contrary, from the Southern ports to Northern Europe, the short route is obviously that along the Gulf Stream, which is also that with the current of the atmospheric stream. To reverse this practice, either way, is deliberately to sail "against wind and tide," if such a stream exist.

The flow of atmospheric waves which, in a recent work, has been described as setting from the coast of America towards Europe, though the writer has not seen that work, he believes cannot be other than the flow of cyclones in that portion of the atmospheric stream lying between the vicinity of New York and the English Channel. The cyclonic character is not always distinct, and sometimes is completely masked by the great distance of the observer from the center, and the consequent apparently rectilinear course of the wind; and the chances of mistake are still further increased when the observer is moving in a course parallel to the path of the center of the cyclone.

These observation have already been brought to the notice of the Smithsonian Institution, and the writer hopes that something will be done in America towards the comprehensive, precise, and detailed inquiry which the subject demands. But unless attention of the same kind be given in Great Britain, and in the voyages of the Atlantic steamships, the resulting information will remain incomplete.

Iron Steamboats for Rivers.

The Cincinnati *Gazette* says: "The recent launch of an iron river steamer is a notable event as one step of progress in what we believe will be a revolution in the water craft of the western rivers, which will greatly reduce the perils and the cost of transportation. Here is an iron boat, 180 feet long, 42 feet wide in the hull, 6½ feet deep, with an iron shell varying from three-eighths to five-eighths in thickness, according to the need, much stronger both in the shell and in the frame than a wooden hull, divided into eight water-tight compartments, with forty feet of the deck of iron, which draws, as launched, but fourteen inches. Such a boat is almost proof against sinking. One, and even two, of her sections may be pierced, and she will still float. Her compartments will greatly reduce the risk of the cargo by fire. There is no reason why she may not last forty years. And by the use of homogeneous steel in the place of iron, by an increase of about fifty per cent in the cost of the plates, a boat may be made of double the strength in the same weight. Iron steamboats and iron barges will carry the trade of these rivers. A new boat will be a thing to outlive the builder, instead of going out in seven or eight years. This city has taken the lead in this revolution, and will hold it. Give us a free river and the upper town will before long ring with the clatter of the hammers riveting the sides of iron boats for this and the Mississippi rivers. And in such extensions of the uses of iron, instead of in monopoly prices which dwarf its uses, will be found the sure foundation of the iron production."

AN ELASTIC PREPARATION OF GLUE.—Dr. Sonnenschein reports (*Polytechniches Journal*) that when a thick solution of glue is mixed with tungstate of soda and hydrochloric acid, there is precipitated a compound of tungstic acid and glue, which, at from 30° to 40° C., is sufficiently elastic to admit of being drawn out into very thin sheets. On cooling it becomes solid and brittle, but when heated, it again becomes soft and plastic. It appears that this material has been successfully employed instead of albumen in calico-printing, in order to fix the aniline colors upon cotton; it is also used in tanning, but the leather becomes as hard and stiff as a plank of wood. It is recommended as a lute or cement.

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ILLINOIS AND ST. LOUIS BRIDGE COMPANY---REPORT OF CAPT. JAMES B. EADS, CHIEF ENGINEER.

The St. Louis bridge, and the great suspension bridge over East River, between New York and Brooklyn, are the two greatest engineering works of the kind now in progress in this country, if not in the world. Both are demonstrating the value of the caisson as an appliance for constructing heavy masonry under water. The former, however, is attended with peculiar difficulties, resulting from the great depth of the abutments, the successful overcoming of which will establish the fame of Capt. Eads as one of the most accomplished engineers of the age.

This gentleman has forwarded to us advance sheets of his report, dated October 1, 1870, from which we shall endeavor to present in the present brief review, and in future extracts, as full as our page space will permit, the more important facts and statements of interest.

The masonry of the west abutment has been carried up from the bed rock of the river to 31 feet above low water. It now contains 6,380 cubic yards of masonry. When completed it will be 115 feet high above the bed rock, and will contain 11,860 cubic yards.

Greater difficulties were encountered in the construction of this pier than in either of the others, owing to the fact that the river at this point had been made the receptacle of every kind of useless material, old sheet-iron, furnace grate-bars, fire-bricks, etc., and two wrecks of vessels had also been sunk on the site of the abutment. More particular mention of these will be found in an extract from the report printed in another column.

The caisson for the east pier was launched October 18, 1869, and on the 25th of October, the first stone was laid upon it. No accident occurred in sinking it, and it reached and rested upon the bed rock on the 28th February, 1870. The bed-rock under this pier is 128 feet below high-water mark. During low water, the depth of sand resting on the bed rock at the site of this pier is 80 feet, at high water it scours down somewhat.

During the sinking of the caisson, the walls at one time sprung a leak, so that the men had to be signaled up. This occurred during extraordinarily high water, and work was suspended till the water subsided.

When the pier had descended 66 feet a telegraphic instrument was placed in the air chamber, and wires led to the office of the Superintendent of construction, and also to the office of the Chief Engineer. The moral effect of the knowledge that means of communicating with the upper world was constantly at hand, is said to have been very salutary on the workmen in the air chamber. The greatest pressure marked by the gages was fifty-two pounds.

Particular attention has been paid to the effect of this great pressure upon the health of the workmen. Capt. Eads' observations on this point are so valuable that we shall publish them in full in a future issue. Suffice it for the present to say that though twelve deaths occurred, one half the men constantly employed from the beginning to the end of the work escaped injury or inconvenience.

Our space is, however, entirely too limited to give anything like an adequate review of this able report. Our extracts from it, one of which will be found in another column, and others which will be found in future issues, will give a better idea of the magnitude of the work, and the ingenious and scientific methods adopted for its accomplishment than a column review could do.

The document is singularly free from any affectation of scientific display, and written in a plain, practical, and common-sense style from beginning to end. It is too full of facts for condensation, and we should be glad had we space to publish it in full, instead of confining ourselves to extracts.

EXPLOSIONS FROM HYDRAULIC PRESSURE.

The very limited compressibility of water and its consequent limited expansion when released from pressure, have led most people to believe that in making hydraulic tests, or in urging the cylinders of hydrostatic presses to their utmost power of endurance, no danger is to be apprehended from explosions. It is reasoned that the smallest rupture of the cylinders would so relieve the pressure that its force would instantaneously be reduced far below that of any expanding gas, and, therefore, that the bursting of a press cylinder could result in nothing more serious than the cost of repairing the damage to the machine.

That this fact does not secure immunity from accident is proved by a casualty which occurred during the testing of a cylinder in Manchester, England, resulting in the death of the man who was performing the test.

The cylinder, which was of steel, was subjected to a pressure of 7,000 lbs. per square inch. It burst under this pressure, fragments of the metal flying off with great force, wounding and killing the person above alluded to.

At the inquest Mr. Ommaney one of the firm owning the works in which the accident occurred, assigned the destructive velocity imparted to the fragments, to the elasticity of the steel.

Had the material of which the cylinder was composed been cast iron, the pieces of iron would have been forced out, and simply have dropped on to the floor, and the water would have flowed out in the usual way, as in a similar case which occurred at their works some time ago. He considered that the damage done was wholly due to the elasticity of the steel, which would be greatly expanded by the water, and when the bolts were displaced it would, as a natural consequence, contract so suddenly as to send the water out with a tremendous force. During the inquest a question was mooted as to whether there was any air left in the cylinder when it was filled, but all the witnesses agreed that such precautions had been taken as to make this absolutely impossible.

A writer in a Manchester paper discussing this accident maintains that the cylinder must have contained air, and such is our opinion. The elasticity of the cylinder does not, to our mind, afford a satisfactory explanation of the accident. The writer referred to argues that in testing such a cylinder (or any other apparatus) as that now under consideration, by means of water pressure, no danger would arise from the fastenings giving way or the metal of the cylinder being ruptured; while, on the other hand, should the vessel contain air, or partly water and air, then the danger is infinitely greater, since the confined air in virtue of its elastic force behaves just as steam of equal pressure would under similar circumstances. The public have read enough of late about boiler explosions to realize the danger attending the use of steam of, say, 50lb. to 100lb., when generated in vessels not sufficiently strong to withstand such a pressure, and yet few can believe that in the case before us a similar force, but exceeding 7,000lb. per square inch, was applied without sufficient precautions being taken to prevent accident. The air in the cylinder should have been completely expelled or displaced by the water before the pressure was applied. Had this been done there would have been no explosion, though the bolts should be too weak to stand the heavy strain upon them. The ram was "hurled a distance of 10 or 12 yards, while the cylinder recoiled about 7ft." Now this is all that any practical man requires to know in order to explain the cause of the accident; and yet, strange to say, the inquest passed without a single ray of light being thrown on the matter. The danger of allowing air to remain in the cylinder during a test has been well recognized, yet it seems that in this case it was overlooked, though the firm in whose works the accident occurred is composed of engineers of established reputation.

The accuracy of the gage used on the occasion is also questioned, and there is little doubt that the gages employed in such tests are often so inaccurate as to be unreliable in their indications of high pressures.

ARTESIAN WELLS.

Some of our readers will remember the article of Professor David Christy, published on page 54, Vol. XVI., SCIENTIFIC AMERICAN, on the subject of artesian wells. His investigations of large areas over the West and South, led him to discredit the common theory, that wells of this character can be obtained anywhere by boring deep enough in the earth's crust. His generalizations were controverted in our columns by several writers.

In addition to the facts then presented, Professor Christy now calls our attention to the late results of the attempts in St. Louis, Mo., to obtain a supply of water for the Insane Asylum at that city. The boring extended to a depth of 3,843⅓ feet without success. No water flows from it at the surface. The attempt has been a failure, and it has been abandoned. Thus the views of Prof. Christy, step by step, are being sustained. A year previous to the work being discontinued upon the boring at the State House, Columbus, Ohio, he predicted its failure in a lengthened essay. The failure of that enterprise proved the soundness of his deductions made from a knowledge of the geology of the surrounding country. The failure at St. Louis now confirms his views. The boring at Columbus was discontinued at the depth of 2,774½ feet.

The Professor calls our attention to this subject, on account of the views of Mr. Greeley presented at the monthly meeting of the New York Historical Society, a few evenings since, in an address relating to "The American Desert," occupying the country between the base of the Rocky Mountains and the Missouri River. This territory, he said, embraced an area of 400,000 square miles; and that "all this tract needed to make it one of the most productive portions of the continent, was water, which, in his opinion, could be readily furnished by artesian wells and other modern methods of irrigation."

Before emigration sets in to that section of country, it will be necessary to test the question whether a subterranean supply of water exists in it, which will rise to the surface. The experiment of the Government exploring party, a few years since, in boring for water, proved a failure, though conducted under the direction of a geologist.

SCIENTIFIC ADMINISTRATION.

The great want in the conduct of the affairs of our Government is scientific administration.

The number of men who have been appointed to office in the United States at any time during the last thirty years on account of any fitness for the positions is lamentably small. The question of fitness is discarded at once, and political considerations are made to outweigh knowledge. So common has it become to appoint men notoriously ignorant of the first principles of government or of political economy, that an education is looked upon as a defect in a man's training for political promotion and the number of persons who think it worth while to seek a liberal education is actually less at the present time than it was thirty years ago, although the population has vastly increased. It is in view of this startling statement of facts that many of our most enlightened citizens have formed a social science association for the discussion of the best way of remedying the evil. They call loudly for a reform in the civil service, and demand that appointments shall be made after competitive examinations and on grounds of fitness, rather than of political affinities.

It will probably require years to break up the present system, but that it ought to be destroyed, no man of intelligence will hesitate to affirm. But it is not alone in the administration of the affairs of the Government that a reform is needed. We could point out quite as urgent a necessity for a radical change in the conduct of private business, as can be found in the more conspicuous mistakes of office-holders. There are many large manufacturing establishments where scientific knowledge is sadly wanting. When we see "Positively no admittance" over the door, we conclude that somebody is afraid to have his ignorance exposed. Wise men know that the chances are altogether in favor of the workmen in every establishment gaining quite as much knowledge from casual visitors as they can themselves impart. We have heard a scientific friend relate how he was denied admission to an establishment in this city where the success of the works depended upon accurate knowledge, on the plea that the processes employed were secret. Subsequent inquiry revealed the fact that no one of any scientific knowledge was employed on the premises, and the fear of having this omission divulged to the stockholders was the occasion of the "No admittance."

Professor Liebig tells a story about a chemical factory he visited in Scotland. The proprietor politely showed the eminent chemist through an establishment for making Prussian blue. The noise of the machinery was so great as to preclude conversation, and the iron scrapers in a revolving mill rubbed so hard against the sides of the hopper as to wear out the shafting in a few months. After the party had returned to the open air, Liebig inquired why it was that the friction was allowed to destroy the scrapers.

"That is precisely the secret of my success," said the proprietor; "I find the more noise the machine makes, the finer is the quality of my product."

The manufacturer actually introduced iron into the prussiate of potash at the expense of his machinery, and he was not a little astonished when Liebig advised him to throw in the iron in the form of scraps and thus accomplish the same results.

This is a fair illustration of the way many capitalists have of avoiding the expense of employing scientific experts—they prefer to grind up their own machinery to asking a few questions for which they will be compelled to pay.

It is impossible to get on in the government, in the shop, in the factory, in the camp, or on the farm without scientific administration. No one who reads aright the lessons of modern times can deny this fact. The whole world is reading this lesson in the conduct of the affairs of Prussia, and in the great success of that nation. Fifty years ago the German nation was overrun by foreign troops, their villages were burned, their crops destroyed, their cities laid under heavy contributions. They were helpless and divided in council, and wholly unprepared for the shock. As soon as the notes of war ceased and the smoke had cleared from the political horizon, the leading statesman of the day began to inquire into the cause of the humiliating condition of affairs. The great minister, Von Stein, the Bismark of those days, was not slow to detect the utter want of scientific administration in all of the affairs of State as well as in the management of trades and manufactures. His remedy was thorough and complete—his reforms laid the foundation of the future grandeur of the German nation. Under his direction the public schools were re-

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modeled and new universities founded. Men were prepared for every department by previous study and careful training. There were schools for forestry, schools for intercommunication, schools for diplomacy, for trades, for mines, for teachers, for soldiers, for professions, for everything that modern civilization required. The highest places in the gift of the Government were open to competition to the lowest citizen, and any man of sufficient talent could aspire to become the rector of the university or the minister of state, and in many instances the highest places were filled with men of the humblest origin.

The first fruits of the seeds sown by Von Stein were a crop of men fully competent to fill every position of responsibility in the nation, and year after year thousands of able men have been at work raising the standard of knowledge and proficiency in every department until we come down to modern times and find a nation thoroughly drilled on every side, with the best scholers, the best soldiers, the best mechanics, the best citizens, the best officers of civil and military affairs; in fact, a nation maintaining a thorough system of scientific administration down to the most minute detail of public and private affairs.

Those who are intimately acquainted with the industries of Germany are aware that such establishments as the iron founderies of Krupp, the salts works of Grueneberg, the ultramarine factories of Nuremberg, and the great wooken and cotton mills scattered over the land, are conducted with the same precision of scientific administration as has been so conspicuous in everything relating to the Prussian armies. In this we have the secrets of success, and a lesson for our careful study and imitation. Scientific administration is what we need in public and private affairs, and we would do well to study the signs of the times and profit by its lesson.

THE GREAT BRITISH PROBLEM.

How to diffuse intelligence over a thousand leagues of ocean is the difficult problem which Hazel has to grapple with in the story of "Foul Play." But this problem was actually solved by the reverend jack-at-all-trades, and hence was certainly not so profound as the one which has so long perplexed the entire English nation, and which may be put as follows: "How to diffuse intelligence from the inside of an English railway coach to the guard at the end of the train."

The cord and bell with which every American is familiar would not answer the purpose of frisky John Bull, who could not refrain from pulling it every now and then, and the method of locking passengers up by themselves renders the execution of such a feeble joke peculiarly easy to young and mischievous Britons.

Many and diverse plans have been suggested by which the removal of the difficulties attending such communication has been sought, but it is a harder knot to untie than communication between England and France across the Straits of Dover, and still remains, like the perpetual motion, something which attracts the minds of inventors only to disappoint their hopes.

The American system of admitting a considerable number of passengers to a single car does not find favor in the eyes of Englishmen. The thing is too democratic, too leveling, to suit their taste. And though it would put an end to the practical jokes of bell pulling and cushion cutting, which seem the idiosyncrasy of youthful and sportive "Bulls," it is, for the reasons stated, a thing not to be thought of.

The peculiar features of the English passenger system have recently been brought out in a strong light by a fight which occurred in a first-class railway carriage between Carlisle and Penrith; one Thomas Bell, a calico printer, and James Quirey, a linen manufacturer, being the combatants. The *Electric Telegraph and Railway Review* thus describes the "mill" and its origin:

"Mr. Bell and Mr. Quirey were the sole occupants of a compartment in a first-class carriage. Immediately after the train left the Carlisle station on its southward journey it seems that Mr. Bell accused Mr. Quirey of having stolen his ticket. This the latter protested he had not done, but notwithstanding all the protestations of innocence, Mr. Bell, in an excited manner, rushed at his fellow-traveler, seized him by the throat with one hand, and, with the thumb and finger of the other hand thrust up his nostrils, dragged him violently backwards and forwards in the carriage until Mr. Quirey's face was sadly cut and bruised. In the course of the encounter Mr. Quirey's collar was torn from his neck, and thrown, saturated with blood, on the carpet, while the windows of the compartment were completely smashed. Passengers in the adjoining compartments heard the cries for help, but, as it unfortunately happened, the passengers' signal was not workable, and Mr. Quirey had to struggle against the violent assaults of his excited adversary, who threatened to kill him, for nearly half an hour, the time occupied in traveling between Carlisle and Penrith, a distance of eighteen miles. On pulling up at Penrith station Mr. Quirey alighted, bruised, bleeding, and much exhausted. Mr. Bell still charged his fellow traveler with having committed a robbery, and on both men being searched the ticket was found on the person of Bell himself. Mr. Quirey then preferred a charge of assault against his assailant, who was taken by the police and locked up in Penrith police station. About six o'clock in the morning a policeman who was on duty at the station looked into the prisoner's cell and found him hanging over the side of his bed with a deep gash in his throat, which had been inflicted with a penknife left in his possession. He was still sensible, but in a very exhausted state through loss of blood.

"On being interrogated by Superintendent Fowler the prisoner replied, 'I would rather suffer death in this way than that I should have been covered with such disgrace.' A medical man speedily dressed the wound, which was a dangerous one. On being brought before the magistrates the prisoner was sadly cast down. He was charged with the assault and also with committing suicide. He had apologized to Mr. Quirey, and offered to pay any amount to himself or to any infirmary if he would withdraw from the case; but this Mr. Quirey declined to do, remarking that it was his duty to the public to prosecute, and the prisoner was committed for trial on both charges, bail being accepted for his appearance."

Truly it would seem that the pugnacity of John Bull is scarcely inferior to his sense of humor.

The journal from which we gather the above statement suggests the electric telegraph as a means for conveying intelligence to the conductor. This might be better than an atmospheric railway, but have our English cousins ever thought of a flying machine for this purpose? If not, we throw out the hint as one that may lead to something.

THE FOREMANIZING PROCESS FOR PRESERVING TIMBER, THE VICTIMS OF ITS POISONOUS EFFECTS, AND THE SUITS AT LAW WHICH HAVE BEEN INSTITUTED TO RECOVER DAMAGES.

The use of the Foremanizing process by the St. Louis, Vandalia, Terre Haute, and Indianapolis Railroad in the preparation of timber for the erection of their depot at St. Louis, the poisoning of a large number of workmen employed on the work, and the death of four or five of the victims, are facts which have been already laid before our readers.

The process which has resulted in such a lamentable disaster is the invention of Mr. B. S. Foreman, of Morrison, Ill. The compound used to preserve the timber from decay consists of the following substances, in the proportions named: one ounce of corrosive sublimate, six ounces of arsenic, and sixteen ounces of common salt.

The directions given for the preparation of the timber are given in a pamphlet kindly sent us by a St. Louis correspondent, the pamphlet being published by B. S. Foreman & Son, of Morrison, Ill. The formula is as follows: "Take the lumber while still green, and pile one layer on the ground, packing close; over this layer sprinkle evenly the dry powder, in the ratio of twenty pounds of powder to every thousand feet of lumber. Lay another layer in the same manner, sprinkle powder in the same proportion, and continue the operation until the amount desired is prepared. Allow this to remain close packed until fermentation has taken place, when the lumber will be fully Foremanized, and from thenceforth free from shrinkage and practically seasoned. N. B.—To induce fermentation of timber a temperature of 45° F. is indispensable."

The effects of working timber prepared in this way were precisely what any one well versed in the nature of the poisonous materials employed would have expected. The men were attacked with blisters and sores. *Œdema arsenicalis* and symptoms imperfectly described as resembling those of venereal disease (the latter undoubtedly the result of exposure by sitting upon the poisoned timber) mingled with the well-known symptoms of poisoning by corrosive sublimate were among the effects of the poisoning.

A *post mortem* examination of one of the diseased workmen revealed the following facts: The stomach was found to be fearfully ulcerated, while the lungs and liver were nearly destroyed by abcesses, the right lung being one mass of corruption. The testimony showed that last spring the deceased had been engaged at work on the Vandalia railroad depot in East St. Louis, the timbers of which had been sprinkled with a white poisonous powder to render them non-combustible, the process being known as Foremanizing; that deceased inhaled this powder, and shortly broke out with ulcerous sores and blisters; experienced great difficulty in breathing; was taken with a chronic and painful diarrhea, and that he gradually became weak and emaciated, and died as before stated. The examining physicians testified that the condition of Smith's body pointed unmistakably to arsenic as the cause of death. The jury then unanimously rendered a verdict that Smith "came to his death by inhaling a poisonous composition used in building the freight depot of the Vandalia Railroad Company, at East St. Louis, Illinois, he being employed by the company as a laborer." Many of the surviving workmen are said to be permanently injured.

Eleven suits have been brought against the railroad company, laying damages at $25,000 each. The declaration of the parties asserts that the railroad company was bound to furnish them good timber to work with, but that instead they were compelled to work upon timber which had been sprinkled with a poisonous powder. This substance they inhaled, absorbed, and otherwise took into their systems, thereby being injured in body to the amount for which the suits are brought.

The case is a somewhat peculiar one, and as it could only have originated either in willful rashness or in culpable ignorance of the usual effects of well-known poisonous substances, we think the plaintiffs are fully entitled to recover the damages for which they sue.

SCIENTIFIC INTELLIGENCE.

IRON BLUE WITHOUT CYANIDES.

A beautiful blue color can be prepared from iron without the aid of ferro-cyanide of potassium. Make a saturated solution of sulphate of iron (green vitriol) in water; convert $\frac{4}{7}$ of this into the sulphate of the peroxide of iron by means of sulphuric and nitric acids, and then add the remaining $\frac{3}{7}$ to the original liquid. Concentrated sulphuric acid, cautiously poured in, to prevent too great heat, will occasion the formation of a blue precipitate, which is, however, soluble in water, but if it be separated from the liquid and rubbed with phosphate of soda, a beautiful blue phosphate of iron is obtained which will resist the action of water, and can be used as a paint.

The mixed hydrates of oxide and peroxide of iron are deprived of water, and prevented from forming higher oxides, by the acids and phosphate. The reaction works well in a small way, and it remains to be seen how far it is capable of application on a large scale. If we can prepare a substitute for Prussian blue without the use of poisonous cyanides it will be a real benefit to calico printers and color manufacturers.

CHLORATE OF BARYTA.

For experiments on explosive mixtures and on chloric acid, a very convenient salt is the chlorate of baryta. This can now be obtained, according to Brandau, in a very simple manner. Commercial crystallized sulphate of alumina, sulphuric acid, and chromate of potash in the ratio of one molecule of each of the two former to two of the latter, are cautiously mixed with water to the consistence of a thin paste, and warmed over a water bath, allowed to cool, and treated with alcohol in excess. Upon filtering and neutralizing with hydrate of baryta, precipitates of sulphate of baryta and hydrate of alumina are formed and barium chlorate remains in solution. The alcohol is distilled off, and on evaporation crystals of pure chlorate of barium are formed. Care must be taken not to pour sulphuric acid upon the chlorate of potash alone, but to use the mixture of acid with the aluminum salt. The chlorate of baryta has no uses at present in the arts, but chloric acid, on account of its powerfully oxidizing properties is capable of extensive application, and the new salt of baryta, above described, may be the means of affording it readily and economically.

NEW USE OF TUNGSTATE OF SODA.

Professor Sonnenschein, of Berlin, has found that when glue in thick solution is mixed with tungstate of soda, and hydrochloric acid is added, then is thrown down a compound of tungstic acid and glue, which, at from 86° to 104° F. is so elastic as to admit of being drawn out into very thin sheets. On cooling this mass becomes solid and brittle, but, on being heated, it becomes again soft and plastic.

This material has been employed as a substitute for albumen in fixing aniline colors in calico printing, and it has been tried in tanning, but produces very hard and stiff leather. As the tungstic acid renders fabrics incombustible, its use in combination with glue in calico printing would be a valuable feature. How far it is applicable in the manufacture of paper and as a substitute for albumen in photography, remains to be seen.

The tungstic glue may also have an application in the manufacture of billiard-balls, buttons, knife handles, and in general as a substitute for india-rubber. It is recommended as a lute and cement.

ADULTERATIONS OF COMMERCIAL ARTICLES.

Some calico of English manufacture was recently analyzed by a Swiss chemist and found to contain 25 per cent of the weight of the fiber of foreign substances, 5 per cent of which consisted of mineral matter. The calico was sold at a price below the value of the yarn it was made of.

A sample of starch intended for calico dressing was found to be adulterated with 16 per cent of gypsum. Some black silk in France was weighted with chemicals that proved to be spontaneously combustible, and nearly set fire to a warehouse in Paris. Paper is also notoriously loaded down with chalk, barytes, or clay, and to make the matter still more complicated, it is found that all of these articles are themselves adulterated, so that the microscope reveals adulterations of adulterations in commercial matters just as it does of parasites living on other parasites, down to the lowest order of living beings. Little fleas have other fleas to bite 'em, and so on *ad infinitum*.

Explosive Power of Nitro-Glycerin.

We condense from the *American Chemist* the following upon the above subject:

A measure containing one cubic foot will hold 796 ounces of blasting powder, and 997·1 ounces of water; or, in other words, the specific gravity of blasting powder, as it is used, is about 0·8. This, of course, takes in the interstices, which are filled with air, but as we do not use the powder in a solid lump, this is, for practical purposes, the specific gravity of blasting powder. Now the specific gravity of nitro-glycerin is 1·6. Therefore, bulk for bulk, if the explosive power were the same in a given mass, as prepared for blasting, the nitro-glycerin would have twice the power.

In reality the following are the volumes of gas generated by each respectively in explosion:

One volume of powder which is considered as most effective, produces:

Carbonic acid gas	221·4 vols.
Nitrogen	74·6 vols.
Therefore one volume becomes	296·0 vols.

Of another kind of powder, which explodes with the gases at a lower temperature, one volume produces:

Carbonic oxide	391 vols.
Nitrogen	66 vols.
One volume becomes	457 vols.

One volume of nitro-glycerin produces:

Carbonic acid gas	469 vols.
Water at 100° C.	554 vols.
Oxygen	39 vols.
Nitrogen	236 vols.
One volume becomes	1,298 vols.

These volumes are given at the temperature 0 deg. C.; at the temperature of explosion, they will be about five times greater, or about 10,607 times the original volume of the explosive, or about ten times as large a production of mixed gases for the nitro-glycerin as for the gunpowder which produces mixed gases in largest amount.

Still thirteen times is claimed by the advocates of nitro-glycerin. If this is so, the discrepancy between the temperature of the explosion must be greater than here assumed.

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Cements.

From the Journal of Chemistry.

A CEMENT WITHSTANDING WATER, ACIDS, OILS, ETC.—Simple shellac, made up into sticks of the size of a lead pencil, is commonly sold for such cement. The objects to be cemented are first warmed till they melt the shellac brought in contact with them. This is very good to cement broken glass, porcelain, etc., especially as the objects are again ready for use immediately when cold; but it is not adapted for flexible objects, as it cracks, and also will not withstand heat or alcohol.

A CEMENT WITHSTANDING HEAT AND ALCOHOL.—Take the best kind of glue; pour on an equal quantity of water; let it soak over night; next morning melt it over a gentle heat, and add fine Paris white, or white lead; mix well, and add a little acetic acid, carbolic acid, oil of cloves, or any other ethereal oil, to prevent putrefaction. This cement is also adapted for flexible objects, like leather. It will not withstand boiling water well, as this softens the glue.

A CEMENT WITHSTANDING HEAT AND MOISTURE.—Pure white lead, or zinc white, ground in oil, and used very thick, is an excellent cement for mending broken crockery ware; but it takes a very long time to harden. It is well to put the mended object in some store-room, and not to look after it for several weeks, or even months. It will then be found so firmly united that, if ever again broken, it will not part on the line of the former fracture.

COATING FOR OUTSIDE WALLS.—The following coating for rough brick walls is used by the U. S. Government for painting light-houses, and it effectually prevents moisture from striking through: Take of fresh Rosendale cement three parts, and of clean, fine sand one part; mix with fresh water thoroughly. This gives a gray or granite color, dark or light, according to the color of the cement. If brick color is desired, add enough Venetian red to the mixture to produce the color. If a very light color is desired, lime may be used with the cement and sand. Care must be taken to have all the ingredients well mixed together. In applying the wash the wall must be wet with clean fresh water; then follow immediately with the cement wash. This prevents the bricks from absorbing the water from the wash too rapidly, and gives time for the cement to set. The wash must be well stirred during the application. The mixture is to be made as thick as can be applied conveniently with a white-wash brush. It is admirably suited for brick-work, fences, etc., but it cannot be used to advantage over paint or white-wash.

The Phenomena of Earthquakes.

In earthquakes, says the *People's Magazine*, we see the conservative agency of fire called in to counteract the destructive agency of water. Wind and rain, heat and cold, are continually at work rending in pieces and grinding down the solid rock; the disintegrated portions of the rock form the soil of the lowlands, and this in its turn is eaten away by running streams, swept down by heavy rains, to be carried by the rivers and deposited in the sea. It is thus that the shallows and great river deltas are formed; and the materials so brought down are gradually, by the action of the waves, distributed over the bed of the ocean. This action, if suffered to continue without interruption, would in time level the highest mountain ranges; and in the place of a varied surface of land and water there would be a uniform shallow sea covering the whole earth. Here the working of fire steps in to counteract the destructive agency of water. It acts suddenly and with terrific force, and therefore it is more noted and more feared than the work which is done so silently and slowly, yet so irresistibly, by the gentle flow of rivers. Of one thing we are sure, that they are caused by the internal heat of the earth. They usually occur in volcanic regions; they are frequently accompanied by volcanic eruptions; during their continuance flames are said to burst from the earth, springs of boiling water rise from the soil, and new volcanoes have been raised as their result. We know that at a comparatively small depth below the surface of the globe there is a temperature very far exceeding anything which we experience at the surface. Whether we accept the hypothesis of a vast central fire, or consider that this heat is generated by chemical action or by electric currents, we know that there are stored up beneath our feet vast reservoirs of heat. What gases are stored under pressure in the cavities of the earth we know not. But we know that the increased expansive force of an elastic fluid under a comparatively small increase of temperature would be sufficient to rend asunder the solid rock and produce the effects we see. Perhaps a fissure so opened may admit water to the heated nucleus, there to be instantly converted into steam with vast increase of volume. This exerting enormous pressure against the rocky walls of the cavity in which it is formed causes a wave of compression in the zone of the rock immediately surrounding it, and this wave is propagated onward through the rock, just as a wave travels through water. The confined fluid strikes the walls of its prison chamber a fierce blow, and this causes a shudder to run through the earth, which passes along the surface as a shock, whose intensity is the only measure we have of the forces causing it.

THE FIRE IN THE EAST RIVER BRIDGE (BROOKLYN) CAISSON.—The fire which recently took place in the East River Brooklyn Caisson, although at the time of its occurrence the dailies succeeded in making quite a sensation out of it, proves to have been nothing serious. The only damage worthy of notice was the delay consequent upon the flooding found necessary to extinguish the fire.

SENATE Committee on Patents: Mr. Willey, Chairman, and Messrs. Ferry, Carpenter, Windom, and Hamilton.

How to Remit with Safety.

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Vulcanized and Carbolized Rubber Hose.

We have been shown specimens of carbolized rubber goods manufactured by the Gutta-Percha and Rubber Manufacturing Co., Nos. 9 and 11, Park Place, N. Y., under patent dated February 15, 1870, which in a comparison with another piece made in the same manner and of the same materials, but not carbolized, and stated to have been used under the same circumstances for the same length of time, shows that the carbolic acid exerts a remarkable preservative action not only on the layers of cloth, but seemingly on the rubber also. The uncarbolized rubber and cloth were in a rotten and damaged condition, while the carbolized was apparently as strong and sound as when new. The antiseptic and preservative qualities of carbolic acid have long been well recognized, and it would seem that the use of it in the manufacture of rubber goods is one of its most recent but valuable applications.

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IMPROVEMENT IN IRON.—An English journal says that at a recent meeting of ironmasters in Birmingham, specimens were shown of purified iron and improved steel manufactured by Sherman's process, as it is called, after the name of the American inventor. Some samples of the steel tested at Chatham dockyard bore a tensile strain of seventy tuns to the square inch, and were at the same time more ductile than any other specimens of the same strength. Common English rough iron by Sherman's method of treatment can be converted into bar steel equal in quality to the best Swedish; so tough and strong that a bar a half-inch square bore a strain of fifty-four tuns to the square inch. The process by which these results are produced is as yet a secret; but we believe that the conversion takes place while the iron is in the puddling furnace.

MANY beneficial uses have been found for carbolic acid, and naturalists now find that by washing out with it the inside of birds which they have not immediate time to skin and stuff, the birds may be kept a week or more in a sound and flexible condition. During the prevalence of the kine pest, carbolic acid was largely used as a disinfectant; and farmers have discovered that the "ticks" which infest sheep and lambs can be killed by dipping the animals in a bath of the acid diluted with water. Great care should be observed not to make the solution too strong, as there is danger that the animals might be killed off along with the tick.

PATENTS.—During the year ending September 30, 1870, there were filled in the Patent Office 19,411 applications for patents, 3,374 caveats, and 160 applications for the extension of patents; 13,622 patents, including reissues and designs, were issued, 11,094 tended, and 1,089 allowed, but not issued by reason of the non-payment of the final fees. The receipts of the office during the fiscal year were $13,630,429 in excess of its expenditures.

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JAMES BOGARDUS,.....Inventor of Iron Buildings.
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EUROPEAN PATENTS.

MUNN & Co. have solicited a larger number of European Patents than any other agency. They have agents located at London, Paris, Brussels, Berlin, and other chief cities. A pamphlet containing a synopsis of the Foreign Patent Laws sent free.

MUNN & Co. could refer, if necessary, to thousands of patentees who have had the benefit of their advice and assistance, to many of the principal business men in this and other cities, and to members of Congress and prominent citizens throughout the country.

All communications are treated as confidential.

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Inventions Patented in England by Americans.

[Compiled from the Commissioners of Patents' Journal.]

PROVISIONAL PROTECTION FOR SIX MONTHS.

2,550.—CENTRIFUGAL MACHINES.—D. McC. Weston, Boston, Mass. Sept. 23, 1870.

2,744.—IMPROVEMENT APPLICABLE TO STOCKS OF MUSKETS.—R. J. Gatling, Indianapolis, Ind. October 2, 1870.

2,782.—MANUFACTURE OF SALT AND THE APPARATUS EMPLOYED THEREIN.—J. R. Buchanan, New York city. October 18, 1870.

2,786.—SPIRAL PUMPS.—T. S. Blair, Pittsburgh, Pa. October 22, 1870.

2,790.—PREPARATION OF INDIA-RUBBER AND GUTTA-PERCHA COMPOUNDS FOR COATING WOODEN AND METAL SURFACES, AND THE PRODUCTION OF HARD RUBBER.—. Chapman, New York city. October 22, 1870.

2,705.—MODE OF TRAINING HOPS, THE SOCKETS FOR THE POLES OR POSTS OF SAME, AND OTHER POSTS, APPLICABLE ALSO FOR THE BORING OF WATER.—E. Blythe, Rochester, N. Y. October 13, 1870.

2,755.—CONSTRUCTION OF ILLUMINATING AND VENTILATING ROOFS AND GRATINGS OR PLATES, PARTS OF WHICH ARE APPLICABLE TO ORDINARY FOOTWAYS AND CARRIAGE WAYS.—Theodore Hyatt, New York city. October 20, 1870.

2,765.—CONSTRUCTION OF BRIDGES.—C. S. Smith, C. H. Latrobe, and F. H. Smith, Baltimore, Md. October 20, 1870.

2,779.—IMPROVEMENT IN AND ADDITIONS TO SKATES.—A. E. Clarke, Montreal, Canada. October 21, 1870.

AUTOMATIC LUBRICATORS.—E. von Jeinsen, San Francisco, Cal. October 24, 1870.

2,805.—HORSESHOES.—Ebenezer Cate, Woburn, Mass. October 24, 1870.

2,862.—LOOMS FOR WEAVING.—Enoch P. Terrel, West Liberty, Ohio. Oct. 31, 1870.

2,866.—MANUFACTURE OF ACIDS AND ALKALINE SALTS.—H. M. Baker, Williamsburgh, N. Y. October 31, 1870.

2,876.—IMPROVEMENTS APPLICABLE TO SAFES, VAULTS, AND OTHER STRUCTURES FOR CONTAINING VALUABLE PROPERTY, AND IN ALARM APPARATUS OR TELEGRAPHS CONNECTED THEREWITH.—E. Holmes, Brooklyn, N. Y., and H. C. Roome, Jersey, N. J. November 1, 1870.

2,890.—APPARATUS FOR PRODUCING AND APPLYING MOTIVE POWER.—J. M. Cayce, W. B. Barfield, and James McEwen, Franklin, Tenn. November 2, 1870.

NEW BOOKS AND PUBLICATIONS.

THE PRINCIPLES OF MECHANISM AND MACHINERY OF TRANSMISSION. Comprising the Principles of Mechanism, Wheels, and Pulleys, Strength and Proportions of Shafts, Couplings for Shafts, and Engaging and Disengaging Gear. By William Fairbairn, Esq., C.E., LL.D., F.R.S., F.G.S., Corresponding Member of the National Institute of France, and of the Royal Academy of Turin; Chevalier of the Legion of Honor, etc. Philadelphia: Henry Carey Baird, Industrial Publisher, 406 Walnut street. Price, by mail, free of postage, $2·50.

From the imposing array of scientific honors appended to the author's name, our readers might be led to suppose that this work was written for others than practical mechanics, but no greater mistake could be made than such a supposition. Mr. Fairbairn, though eminently scientific, is one of the most practical of men, and he knows to a nicety the wants of practical men. This book is written in the plainest and most concise style, and may be read with profit by those to whom algebra and geometry are unsealed mysteries. There are a few algebraic formulæ in the book, but the larger portion is written in plain English. The work treats of a great variety of subjects included in the general classification given in the title, and ought to be in every mechanic's library.

THE ATTITUDE OF SCIENTIFIC INVESTIGATION TOWARD DIVINE REVELATION. An Essay Read before the Associate Alumni of the General Theological Seminary of the Protestant Episcopal Church at their Annual Meeting in the Chapel of the Seminary, New York, St. John Baptist's Day, June 24, A.D., 1870. By the Rev. Richard Whittingham, Rector of St. John's Church, New Haven, Conn.

This is an effort to show that the asserted antagonism of science with orthodox theology is a real one, and that so-called science is full of contradictions. Professor Huxley is made the object of direct attack, and his "Lay Sermons" are denounced as calculated to poison the minds of thousands who them. It must be conceded that in that part of his argument based upon the contradictions of science, the author makes some strong hits.

CATALOGUE OF PRACTICAL AND SCIENTIFIC BOOKS Published by Henry Carey Baird, 406 Walnut street, Philadelphia, Pa. Sent free to any address.

This catalogue comprises the most complete list of industrial publications on all subjects pertaining to the arts and manufactures, published in this country. To mechanics, engineers, and manufacturers, no matter in what department, it offers works of sterling value expressly prepared to suit their practical needs. Young mechanics seeking for guides in their various callings will do well to send for this catalogue.

A TEXT-BOOK OF ELEMENTARY CHEMISTRY, THEORETICAL AND INORGANIC. By George F. Barker, M.D., Professor of Physiological Chemistry in Yale College. 12mo, pp. 342. New Haven: Charles C. Chatfield & Co.

In nothing is the great change that has taken place in the nomenclature of chemistry and in the symbolic language of the science more conspicuously shown than in some of our recent text-books. Professor Barker has prepared a remarkably accurate book founded on the most advanced theories and doctrines of chemistry, and no teacher who desires to keep abreast of the times can afford to be without it.

THE RIGHTS OF AMERICAN PRODUCERS AND THE WRONGS OF BRITISH FREE TRADE REVENUE REFORM. By Henry Carey Baird. Philadelphia: Collins, Printer, 705 Jayne street.

This is the title of a strong argument from the trenchant pen of an able writer upon a subject in which every American citizen is interested. It is a small pamphlet, printed, we believe, for gratuitous circulation.

LAY SERMONS, ADDRESSES, AND REVIEWS. By Thomas Henry Huxley. 8vo., pp. 378. New York: D. Appleton & Co. 1870.

The Messrs. Appletons have reprinted on very poor paper and in inferior style, the famous lectures delivered before popular audiences in England by Professor Huxley. Few books of greater importance have appeared within a long period. The topics discussed relate to the origin of life, scientific education, and the most advanced theories of the new school of thinkers in England. However slow many readers may be to accept the reasoning of the writer, every one must be swift to acknowledge that the subject is handled in faultless language and the most captivating style.

THE AMERICAN JOURNAL OF ARTS AND SCIENCE. New Haven, Conn.: B. Silliman and James B. Dana.

The November issue contains a number of very exhaustive scientific articles. Examination of the Bessemer Flame," by Prof. J. M. Silliman; "Electrical Conductivities," by Alfred M. Mayer; "Northern Drift of the Pacific Slope," by Robert Brown; "Influence of Temperature on the Electricity of Certain Metals;" "Willet on the Georgia Meteoric Stone," and "Hovey on Hailstorm of June, 1870," are leading and able papers.

WE are in receipt of THE WORKSHOP, for Septemter, a German publication devoted to progress of the useful arts, and republished in English, and also in German, French, and Italian, by E. Steiger, 22 and 24 Frankfort street, New York. As usual it contains a large number of original and beautiful designs, adapted to the wants of manufacturers in various departments where ornamental designs are requisite. It contains also an interesting essay on Chandeliers, illustrated with many engravings, and other minor articles of practical interest.

QUERIES.

[We present herewith a series of inquiries embracing a variety of topics of greater or less general interest. The questions are simple, it is true, but we prefer to elicit practical answers from our readers, and hope to be able to make this column of inquiries and answers a popular and useful feature of the paper.]

1.—PAINT FOR STEAM PIPES.—What paint can I use for steam pipes that will give them a brilliant red, vermilion, or white, and not discolor by heat?—J. McB.

2.—COLORLESS DRYER.—How can I make a colorless dryer to be used in fine, delicate colored paints, for drying quickly, so they will not scale and crack when dry? The dryer should be of the consistency of good linseed oil, and dry paints in five to six hours.—C. R. P.

3.—BOILER CAPACITY.—I am running an engine (common slide valve), size, 12 inches by 18 inches, cylinder; 150 revolutions per minute; boiler pressure, 70 pounds; steam pipe, short and well covered; taking steam from a locomotive boiler containing 300 square feet heating surface; boiler well covered by a thick jacket, and a ½ inch blower pipe, besides the exhaust, running into the smoke stack. Fuel, wood; feed water, hot. I cannot make steam fast enough to keep my pressure up to 70 pounds. I want more boiler power, and am offered two cylinder boilers 30 inches in diameter and 40 feet long, and I am told they will supply me with sufficient steam. Query: Will two cylinder boilers 30 inches in diameter and 40 feet long make sufficient steam, with wood for fuel, to run an engine (common slide valve), with 12 by 18 cylinder, 150 revolutions per minute, requiring 70 pounds steam to do the work?—W. V. B.

4.—HEATING SURFACE OF TUBES.—In counting the heating surface of tubular boilers, is it most proper to calculate the internal or external circumference of the tubes? I should like to know the opinion of your correspondents in regard to this.—W. V. B.

5.—TO KEEP POLISHED BRASS FROM TARNISHING.—I should like information on the best methods of keeping polished brass from tarnishing. What have the readers of the SCIENTIFIC AMERICAN found best for this purpose?—O. F.

6.—SOLDERING STEEL.—I wish a recipe for a flux that may be used to solder steel, and will not cause polished metal to rust.—H. W. M.

7.—CEMENT.—What is the best cement for laying stone in cold weather where it is exposed to the action of frost and water?—B. F.

8.—TO PURIFY BLACK OIL.—How can I purify oil that has been used on shafting, so as to fit it for re-use on the same?—A. C.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at $1·00 a line, under the head of "Business and Personal.

All reference to back numbers should be by volume and page.

SCATTERING SHOT GUN.—J. G. T., of Texas, has a shot gun which scatters too much, for which he seeks a remedy. Being well posted in gun matters, I can give him some ideas. The only remedy known to gun-smiths is by choke-boring, that is, boring from the breech of the gun, and so as to have a gradual taper towards the muzzle. This method of boring greatly improves the shooting qualities of the gun, as the charge concentrates at the muzzle. I have bored some guns so much for this purpose, that the diameter of the bore at the breech was one eighth of an inch larger than at the muzzle, before they would shoot well. All of the pigeon-shooting clubs have their guns bored in this manner. Large shot are more apt to scatter than fine, but this depends on the bore of the gun. A large-bored gun does not shoot fine shot so well as medium. A small-bored gun throws fine shot with greater force than a large-bored one. As a general thing, a small-bored gun is not adapted to large shot, as it does not chamber them well. The length of gun also depends on the size of bore—28 or 30 inches for a gun of from 10 to 14 gage; 30 to 34, of guns from 8 to 10; 26 to 28, guns of 15 to 18 gage.—C. W. L., of Mass.

DRILLING SMALL HOLES IN BRASS PLATE.—G. F. may perform the nice job he has undertaken, in the following manner: Fasten the piece to be drilled to a face plate that runs perfectly true, so that the center of the proposed hole is exactly in the center line of the lathe. First run through on the center a twist drill, smaller than the desired hole. Then make from Stubs wire, the size of the hole desired, a half round drill, and having bored out the hole with a small boring tool or graver just so the half-round drill will enter, feed through on the center, and the drill will go through perfectly straight, and make a perfect hole.—T. G. C., of Vt.

BULLET MOLDS.—The hollow hemispheres J. B. C. inquires about, are made with reamers, called by gunsmiths cherries, which can be bought of any gun-furnishing establishment. Fit both parts of the mold and rivet them; then drill a hole in them as as large as the shank of the cherry. Put in the cherry, and hold the molds in the vise; tighten as fast as you ream, and use plenty of oil, and while finishing keep the cherry very clean.

DRILLING SMALL HOLES IN BRASS PLATE.—G. F. should lay out the holes to be drilled in the brass plate as accurate as possible, and mark deep with a center punch (which should be turned). Send for a Morse twist drill, the proper size, as short as possible, and go through the work. Have the drill run perfectly true and rapid, feed slow, and he will do a good job.—H. W., of N. Y.

FEED ROLLS ON DOUBLE BEATER SCUTCHER.—"Workman's" feed rolls are not near enough to the knives of the beater. If distant over one fourth of an inch, the tendency is to clog, which, of course causes the cotton to be unevenly distributed.—C. M., of Mass.

TURNING ZINC SHAFTS.—In answer to G. D. B., I would say that zinc shafts can be turned in a lathe. I have turned ⅜ and ½ inch with a very fine diamond-point tool. Set the tool as high as it will cut nicely.—O. F., of Pa.

H. L C., of Mich.—Bodies are classed with reference to their power to let heat pass through them without becoming heated themselves, and the reverse, as "*diathermanous*" and "*athermanous;*" the former term being applied to those which allow heat to pass freely without becoming heated themselves, and the latter term to bodies of the opposite character. A beam of solar light and heat in passing through water imparts a portion of its heat to the water, as ascertained not only by the increase of temperature in the water, but in the diminished heat of the beam after its passage. Therefore water is not a diathermanous body. You will find this subject fully treated in "Silliman's Physics."

N. L., B., of Ill.—This correspondent with others is puzzled to see what supports the atmosphere, if it is not wholly supported by the earth. The subject has no practical importance, and we do not wish to burden our columns with a protracted discussion of it.

W. McL., of N. Y.—With reference to the use of the Brazilian pebble, we have never heard from any reliable source that it was injurious to the eye. Oculists have recommended it, but it may be that some new facts have been brought to light. You had better consult with Dr. Agnew, or some other well known oculist.

B. C., of N. H.—Steam boilers vary in evaporative capacity from say five to ten pounds of water to a pound of coal. It is a good boiler that will evaporate eight pounds of water per pound of coal. The actual horse power developed by the evaporation depends upon the engine which consumes the steam. It is a first-class engine that will run on three pounds of coal per horse power per hour with a good boiler, though still greater economy with the very best engines is attained.

H. W., of N. Y.—Have you not mistaken the drift of L. V.'s query? It is not a straight cylinder he wishes to bore, but a bent cylinder, a segment of a hollow cylindrical ring, part of a circular hollow ring, we suppose.

J. R. T., of Cuba.—We do not know how many of Fowler's steam plows have been introduced into this country. There may be two or three but they are not much used here.

J. M., of Canada.—We do not think you can get an electro-magnetic machine such as you want in this country.

T. W. T., of ——.—The theory of an all permeating, all pervading ether, supposes this substance to be so highly attenuated as to show no sensible ponderability, that it possesses a higher degree of elasticity

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than any known substance, that it permeates the molecular spaces of all bodies, solid, liquid or gaseous, and fills the interplanetary regions.

H. F. H., of Md.—Solder for fruit cans is made of half tin and half lead. It is the common tin solder.

C. H. C., of Ill.—A mortise made in green wood will become smaller as the wood shrinks in drying.

S. P., of Wis.—We shall drop the subject of "Balancing Cylinders" for the present.

G. W. P., of L. I.—Your idea is not new. Fell's railroad over the Alps has a center rail with two friction wheels that grip its sides.

J. S., of N. Y.—In the absence of skill on your part, printed directions can be of no value. You had better go to a good watchmaker.

Sensible Holiday Presents.

No present can be more acceptable to a wife, mother, sister, or lady friend, than a DOTY WASHING MACHINE, price $14, and a UNIVERSAL WRINGER, $9, which are warranted to give entire satisfaction. Mr. R. C. BROWNING, Gen'l Ag't, 32 Cortlandt street, N. Y., will, on receipt of the price, send either or both Machines, free of freight, to places where no one is selling; and, after using them a month, according to directions, if not entirely satisfactory, they may be returned, free of freight, and the money will be refunded. Can anything be more fair?

The American Newspaper Directory,

Published by Geo. P. Rowell & Co., Advertising Agents, No. 40 Park Row, New York, contains a full and complete statement of all facts about newspapers which an advertiser desires to know. The subscription price is five dollars.

Business and Personal

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per Line will be charged.

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin, $4 00 a year. Advertisements 17c. a line.

"507 Mechanical Movements." This Illustrated Book, now in its 6th edition, embraces all departments of Mechanics, and is invaluable for reference and study. Each movement fully illustrated and described. Price $1. By mail $1 12. Address Theo. Tusch, 37 Park Row, New York.

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Self-Closing Telegraph Key, Frey Patent. Liberal terms to Agents. A. Illing, 213 Church st., New York city.

For Sale—Lathe. Second-hand Engine Lathe, back-geared, screw-cutting; swings 25½ inches; 9 ft. 9 in. between centers. Vandcuzen & Tift, Cincinnati, Ohio.

Index Milling Machine, $100. Thomas & Co., Worcester, Mass.

Fine Pedespeed Skating without ice. Order a pair with 16 inch wheels, $16, or 17 inch $17, at the works, C. O. D. T. L. Luders, Olney, Ill.

For Sale—A part or the entire right of my Weaning Bit, for the weaning of colts, calves, etc. Pat. June 21, 1870. Address Isaac L. Baker, Prairie City, Kansas.

Machinery Wanted.—Two Screw Presses and Paper Cutting Machine, second hand. Address, with terms, Wm. Pratt & Co., 98 Liberty st.

Soap Stone Packing, all sizes, in lots to suit. Greene, Tweed & Co., 10 Park Place, Manufacturers' Agents.

Walrus Leather, for Polishing Steel and Plated Ware. Greene, Tweed & Co., 10 Park Place, New York.

Baxter's Portable Steam Engine. For descriptive Pamphlet address Russell & Speer, 10 Park Place, New York.

Millers.—An experienced, practical miller wants a situation. Address W. J. Groves, 814 Washington avenue, St. Louis, Mo.

News for every Machinist, Apprentice Machinist, Gunsmith, and Blacksmith in the United States. Address, with stamp, Mechanical Association, Box 418, Marshall, Mich.

Dickinson's Patent Shaped Diamond Carbon Points and Adjustable Holder for dressing emery wheels, grindstones, etc. See Scientific American, July 24 and Nov. 20, 1869. 64 Nassau st., New York.

Peck's Patent Drop Press. For circulars address the sole manufacturers, Milo, Peck & Co., New Haven, Ct.

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Hand Screw Punches and Lever Punches. American Saw Co., New York.

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Corn-shuck Collars.—C. H. Leffler, of Montgomery, Ala., wants a machine that will receive the Corn Shucks and plait them into a collar.

Self-testing Steam Gage—Will tell you if it is tampered with, or out of order. The only reliable gage. Send for circular. E. H. Ashcroft, Boston, Mass.

Scientific American—Back Vols. and Nos. for sale. Volumes bound, $3. Nos. 10c. each. Address Theo. Tusch, 37 Park Row, New York.

Peck's Patent Drop Press. Milo Peck & Co., New Haven, Ct.

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Manufacturers and Patentees.—Agencies for the Pacific Coast wanted by Nathan Joseph & Co., 619 Washington st., San Francisco, who are already acting for several firms in the United States and Europe, to whom they can give references.

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Machinery for two 500-tun propellers, 60-Horse Locomotive Boiler, nearly new, for sale by Wm. D. Andrews & Bro., 414 Water st., N. Y.

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Japanese Paper-ware Spittoons, Wash Basins, Bowls, Pails, Milk Pans, Slop Jars, Chamber Pails, Trays. Perfectly water-proof. Will not break or rust. Send for circulars. Jennings Brothers, 352 Pearl st., N. Y.

A very Valuable Patent for sale, the merits of which will be appreciated at sight. Apply to or address Jewell & Ehlen, 93 Liberty st., N. Y.

Improved Foot Lathes. Many a reader of this paper has one of them. Catalogue free. N. H. Baldwin, Laconia, N. H.

Belting that is Belting.—Always send for the Best Philadelphia Oak-Tanned, to C. W. Arny, Manufacturer, 301 Cherry st., Phil'a.

For Fruit-Can Tools, Presses, Dies for all Metals, apply to Mays & Bliss, 118, 120, and 122 Plymouth st., Brooklyn, N. Y. Send for catalogue.

Parties in need of small Gray Iron Castings please address Enterprise Manufacturing Co., Philadelphia.

Best Boiler-tube Cleaner—A. H. & M. Morse, Franklin, Mass.

The Best Hand Shears and Punches for metal work, as well as the latest improved lathes, and other machinists' tools, from entirely new patterns, are manufactured by L. W. Pond, Worcester, Mass. Office 98 Liberty st., New York.

For Solid Wrought-iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

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Cold Rolled-Shafting, piston rods, pump rods, Collins pat. double compression couplings, manufactured by Jones & Laughlins, Pittsburgh, Pa.

For mining, wrecking, pumping, drainage, and irrigating machinery, see advertisement of Andrews' Patents in another column.

Incrustations prevented by Winans' Boiler Powder, 11 Wall st., New York, 15 years in use. Beware of frauds.

Glynn's Anti-Incrustator for Steam Boilers—The only reliable preventive. No foaming, and does not attack metals of boilers. Price 25 cents per lb. C. D. Fredericks, 587 Broadway, New York.

To Ascertain where there will be a demand for new machinery or manufacturers' supplies read Boston Commercial Bulletin's Manufacturing News of the United States. Terms $4 00 a year.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

CAST-IRON PLOW.—John K. Odell and William S. Little, Deckertown, N.J. This invention has for its object to improve the construction of cast-iron plows, so as to make them simpler in construction, stronger and better in operation, and more convenient in manufacture than when made in the ordinary manner.

COMBINED HAND SEED-DRILL AND CULTIVATOR.—Samuel D. Lucas, Winterpock, Va.—This invention has for its object to furnish a simple and convenient hand machine, which shall be so constructed that it may be readily adjusted for planting various kinds of seeds, that require to be planted in drills or rows, and for cultivating the plants when required.

SHIFTING SHOVEL PLOW.—Adam Snyder, Packard, Ohio.—This invention has for its object to furnish an improved shovel plow, which shall be so constructed that the shovel may be set square with the line of draft, or inclined to one or the other side, as may be desired.

SCRUBBING BRUSH.—Ralph Rockwell and Z. B. Custer, Petroleum Center, Pa.—This invention relates to the manner of securing the bristle stock of a scrubbing brush to the base board bearing the rubber strip that operates as a dryer, and in the manner of pivoting the handle to said base board, whereby the stock is prevented from lateral movement or displacement, and the handle may be inclined in either direction, to enable the operator to work the brush with either the rubber or dryer in front.

BOILER FOR PREPARING PAPER PULP.—Lorenzo Dean, Fort Edward, N. Y.—This invention has for its object to improve the construction of the boilers ordinarily used for reducing paper stock, so as to make them more convenient and effective in operation, and enabling the stock, when reduced, to be washed and bleached without removing it from the boiler in which it has been reduced.

SAWING MACHINE.—Daniel Heller, Milton Center, Ohio.—This invention has for its object to furnish an improved machine for operating a "cross cut" or other wood saw, which shall be simple in construction and effective in operation, enabling one man to do more work than two with the ordinary saw, and with greater ease.

PREPARING STRAW, ETC., FOR THE MANUFACTURE OF PAPER.—Lorenzo Dean, Fort Edward, N. Y.—This invention has for its object to furnish an improvement in preparing straw and other fibrous material for the manufacture of paper, by means of which the labor and expense will be greatly diminished, and the material, when reduced, will produce a much better stock.

SETTING TIRES ON WHEELS.—A. O. Wheeler, St. Augustine, Ill.—This invention relates to a new and useful improvement in mode of setting or tightening and loosening the tires of carriage or other wheels, and consists in increasing the diameter of the whee or expanding the felly by means of a tapering screw, operating in a divided nut.

LUBRICATOR.—Samuel S. Vollum and William H. Green, New York city.—This invention relates to a new and useful improvement in a device for conveying oil or other lubricating material to the arms of carriage axles, or to journals, boxes, or bearings.

BEVELING THE EDGES OF CIRCULAR PLATES OF METAL.—William H. Singer, Pittsburgh, Pa.—This invention is an improvement for which a patent was issued to the same party Nov. 30th, 1869, and consists in providing a mechanism for holding the circular blank on which a beveled edge is to be produced, without enlarging the central hole through which the stepped vertical holding pin passes, and whereby the whole of that part of the blank to be beveled is introduced between the rolls at once.

PACKING BOX FOR ROTARY STEAM CYLINDERS.—S. Deacon and J. Russel, Lawrence, Mass.—This invention relates to a new packing box for revolving steam cylinders, and consists in the arrangement of a nut that serves to clamp the packing between two cones, and which, instead of working on a screw thread is moved longitudinally by contact with a fixed cam.

HORSE POWER.—Lorenzo P. Teed, Mechanicsburgh, Pa.—This invention has for its object to furnish an improved horse power, which shall be so constructed and arranged that it may be firmly secured in place, and securely held while at work, being secured and adjusted conveniently and quickly, and without removing it from the wagon.

COFFEE STEAMER.—Louis Hildenbrand, Michigan City, Ind.—This invention relates to an apparatus for rapidly extracting the aromatic ingredients from coffee-beans by means of steam created by the heat of a stove or other heater, with an object of utilizing the full virtue of the beans, and consequently economizing coffee and producing a beverage superior to that made by the means heretofore in use.

PROCESS OF SACCHARIFYING MASH.—Charles H. Frings, Centreton, Mo.—The object of this invention is to produce a perfect saccharifying of mash without waste of malt. For this object a small quantity of muriatic acid and phosphoric acid is added to the water used for converting the grain into mash; corn, rye, barley, wheat, or other grain being used.

MACHINE FOR POLISHING COFFEE-BEANS.—Charles C. Warren and James B. Baldy, Toledo, Ohio.—The object of this invention is to construct a machine, whereby coffee can be rapidly cleaned and polished in bags; and the invention consists in the employment of two or more rollers, of which the outer surfaces are employed for revolving the filled bags.

STREET LETTER-BOX.—Albert Potts, Philadelphia, Pa.—The object of this invention is to so construct letter-boxes which are to be applied to lamp-posts, pillars, or other similar supports, that can be readily fitted on, firmly retained, safely closed, and conveniently used. See an illustrated description of this invention in another column.

DOOR SPRING.—William H. Stafford, New York city.—This invention relates to a new spring of very simple construction for holding doors shut, and is applicable to all kinds of doors, whether they are hinged to swing to one or both sides.

MACHINE FOR POINTING NAILS.—Harry A. Wills, Vergennes, Vt.—This invention relates to a new machine for pointing the ends of nails used for horse shoes and other purposes. The invention consists in a new spiral feeding apparatus for conveying the nail blanks to the pointing mechanism. The invention consists also in a new arrangement of gaging, clamping, and pointing mechanism.

Official List of Patents.

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109,793.—KNITTING MACHINE AND NEEDLES.—A. W. Allen, Indianpolis, Ind.
109,794.—CLOTH-WINDING MECHANISM FOR LOOMS.—W. A Arnold, Rockport, Mass.
109,795.—LUBRICATOR.—C. D. Austin, Newcastle-on-Tyne, England.
109,796.—VALVE COCK.—Robert Berryman, Boston, Mass.
109,797.—CAR COUPLING.—Henry Blanchard, Jr., Boston Mass.
109,798.—BELT FASTENER.—S. S. Bolton, Big Rapids, Mich.
109,799.—BEDSTEAD JOINT.—L. G. Bradford (assignor to himself and N. H. Morton), Plymouth, Mass.
109,800.—CURTAIN FIXTURE.—J. G. Brothwell (assignor to Turner, Seymour & Judds), Wolcottville, Conn.
109,801.—SASH LOCK.—E. L. Brown, Norwich, N. Y.
109,802.—APPARATUS FOR EVAPORATING BRINE AND OTHER LIQUIDS.—James Buchanan, Detroit, Mich.
109,803.—BRICK MACHINE.—Cyrus Chambers, Jr., Philadelphia, Pa.
109,804.—COTTON BALE TIE.—William Chambers, New Orleans, La.
109,805.—TINSMITH'S FURNACE.—Michael Conner, Plymouth Mich.
109,806.—CIRCULAR SAW JOINTER.—E. H. Corbin, Winchester, Ind.
109,807.—STEAM GENERATOR.—L. R. Cornell, Flatbush N. Y.
109,808.—RAILWAY RECLINING CHAIR.—J. P. Curry, New York city.
109,809.—NUT LOCK.—M. A. Cushing and O. R. Glover, Ottawa, Ill. Antedated November 26, 1870.
109,810.—WASHING MACHINE.—Henry Dickinson, Marlborough, Conn.
109,811.—REFRIGERATOR.—H. F. Eberts, Detroit, Mich., assignor to himself, D. Y. Howell, Toledo, Ohio, and T. S. Sprague, Detroit, Mich.
109,812.—CULTIVATOR.—Abraham Eshleman, Martinsville, Pa.
109,813.—BARREL SAFETY VALVE OR VENT.—B. F. Evans, Newburyport, Mass.
109,814.—HAND STAMP.—D. W. Fish, Brooklyn, N. Y.
109,815.—PERPETUAL BRICK-BURNING KILN.—William Gilbert, Detroit, Mich.
109,816.—SEWING MACHINE FOR MAKING PUFFINGS.—E. D Gird, Syracuse, N. Y. Antedated November 25, 1870.
109,817.—WAGON TONGUE SUPPORT.—A. F. Gue, Eastmanville, Mich.
109,818.—SHUTTER FASTENER.—Theodore Hare and James Wood, Norristown, Pa.
109,819.—SNOW PLOW.—C. F. Hornbeck and W. J. Carns, Slaterville, N. Y.
109,820.—DEVICE FOR FREEZING FISH, MEATS, ETC.—D. Y. Howell, Toledo, Ohio, assignor to himself, T. S. Sprague, and H. F. Eberts, Detroit, Mich.
109,821.—BOX FOR PACKING FRUIT, PROVISIONS, ETC.—G. M. Huston, Putnam, Ohio.
109,822.—FEED CUTTER.—William Hutchins (assignor to himself and G. G. Hutchins), Paw Paw, Mich.
109,823.—HEAD REST FOR CAR SEATS.—E. M. Judd, New Haven, Conn.
109,824.—JELLY GLASS.—W. M. Kirchner, Pittsburgh, Pa.
109,825.—TOOL FOR FORMING SCREW THREADS ON GLASS JARS.—W. M. Kirchner, Pittsburgh, Pa.
109,826.—HAIR-SPRING OF WATCHES, ETC.—Calvin Kline, Brooklyn, N. Y., assignor to himself and G. E. Hart, Newark, N. J.
109,827.—POCKET BOOK.—Julius Lehman, New York city.
109,828.—SEWING MACHINE.—T. A. Macaulay, Northampton, Mass.
109,829.—STEAM BOILER.—W. B. Mack (assignor to D. B. Duffield), Detroit, Mich.
109,830.—CAR COUPLING.—Stephen Mahurin, Liberty, assignor to himself, J. W. Singleton, and W. A. Richardson), Quincy, Ill.
109,831.—SAUSAGE STUFFER.—Jacob Mickley and J. E. Hartman, Cashtown, Pa.
109,832.—WAGON BRAKE.—Jacob Mickley and J. E. Hartman, Cashtown, Pa.
106,833.—VARNISH FOR PHOTOGRAPHIC NEGATIVES.—J. W Morgeneier, Sheboygan, Wis.
109,834.—DOOR LATCH.—W. T. Munger (assignor to P. & F. Corbin), New Britain, Conn.
109,835.—TREADLE FOR SEWING MACHINES.—Alfred Nielson, Brooklyn, N. Y.
109,836.—WASHING MACHINE.—L. B. Osgood, Shelby, Mich.
109,837.—CORN PLANTER.—George Paddington, Waubeck, Iowa.
109,838.—STOVE-PIPE THIMBLE.—J. D. Pierce and J. B. Smith, Milwaukee, Wis.
109,839.—GRAIN SEPARATOR.—Hiram Raymond, Tecumseh Mich.
109,840.—WASHING MACHINE.—John G. Raymond, Rondout N. Y.
109,841.—BURR MILL.—S. G. Rollins (assignor to Wigg, Rollins & Co.), Boston, Mass. Antedated November 26, 1870.
109,842.—CARRIAGE AXLE AND AXLE YOKE.—Samuel Rowell, Amesbury, Mass.
109,843.—WAGON BRAKE.—George W. Sanborn, Gilmanton N. H.
109,844.—MACHINE FOR STAMPING, PRESSING, AND POINTING HORSESHOE NAILS.—Frederick Sandham, Montreal, Canada.
109,845.—LAST FOR BOOTS AND SHOES.—Samuel W. Shorey Chicago, Ill. Antedated November 26, 1870.
109,846.—SHAFT COUPLING.—William Smeed, Rochester assignor to himself and Glen & Hall Manufacturing Company, Brighton N. Y.

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109,847.—MILKING STOOL.—George Smith, Syracuse, N. Y.
109,848.—APPARATUS FOR THE MANUFACTURE OF GAS FROM HYDROCARBONS.—James H. Smith, Newark, Ohio.
109,849.—BUCKLE.—G. E. Stedman, Boston, Mass.
109,850.—PILE FOR BEAMS.—Joseph Stokes, Trenton, N. J.
109,851.—MACHINE FOR COUNTERSINKING THE HOLES IN BUTT HINGES.—Lucius P. Summers (assignor to P. & F. Corbin), New Britain, Conn.
109,852.—BED BOTTOM.—Charles Valkmar, New York city.
109,853.—SUSPENDER.—Joseph Warren Wattles, Canton, Mass.
109,854.—MACHINE FOR TRUSSING BARRELS.—Peter Welch, St. Louis, Mo.
109,855.—SPRING HINGE.—Wm. Wells, Cleveland, assignor to himself and John Wrigleswortb, Mentor, Ohio.
109,856.—LANTERN.—H. J. White, Boston, Mass.
109,857.—PROCESS OF SEPARATING THE HAIR FROM THE WARP IN HAIR CLOTH.—David Whitley, Providence, R. I.
109,858.—WIRE FENCE.—Bartholemew Wilson and F. P. Grimes, Dayton, Ohio.
109,859.—TREE PROTECTOR.—B. L. Alley, Salem, and T. W. Shapleigh, Cambridgeport, Mass.
109,860.—CLOTHES DRYER.—Charles R. Anderson St. Louis, Mo.
109,861.—CORPSE PRESERVER.—R. C. Andrus, Poughkeepsie, N. Y. Antedated December 3, 1870.
109,862.—DRAIN TILE MACHINE.—H. F. Baker, Centerville, Ind.
109,863.—HAY TEDDER.—Orville A. Benton, Amenia, N. Y.
109,864.—ATTACHING LAMP-FOUNTS TO BRACKETS, CHANDELIERS, ETC.—George Bohner, Chicago, Ill.
109,865.—APPARATUS FOR CLEANING AND POLISHING COFFEE.—J. H. Brookmire, St. Louis, Mo.
109,866.—FRICTION ROLLER.—William Brown, Portsmouth, England.
109,867.—ICE AX AND PICK.—John N. Bunnell, Unionville, Conn. Antedated November 25, 1870.
109,868.—COMBINED RULE, BEVEL, SQUARE, AND DIVIDER.—George G. Burgess, Grafton, Ohio. Antedated November 26, 1870.
109,869.—INSECT DESTROYER.—Thomas Byrne, New York city, and Deidrich Strunk, Lavaca county, assignors to themselves and J. J. Schott, Lavaca county, Texas.
109,870.—JOURNAL LUBRICATOR.—J. A. Cowles, Chicago, Ill. Antedated November 30, 1870.
109,871.—BUCKLE.—L. D. Cowles, Romeo, Mich.
109,872.—SEASONING AND PRESERVING WOOD.—Charles M. Cresson, Philadelphia, Pa., assignor to American Wood Protection Company.
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109,877.—LOCOMOTIVE HEAD LIGHT.—S. M. Davies, Chicago, Ill. Antedated November 23, 1870.
09,878.—ROTARY ENGINE.—William A. Davis, Salem, Ohio.
109,879.—INSULATOR FOR TELEGRAPH WIRES.—Manuel De Montufar, New York city.
109,880.—CASTING T'S FOR OIL WELLS.—Julius Dickey, Titusville, Pa.
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109,884.—HARNESS-OPERATING MECHANISM FOR LOOMS.—John C. Duckworth, Pittsfield, Mass.
109,885.—WATER-WHEEL.—William H. Elmer, Berlin, Wis. Antedated November 25, 1870.
109,886.—IRON CULVERT.—Moody G. Freeman, Wenona, Ill.
109,887.—SACCHARIFYING MASH FOR GRAIN.—Charles H. Frings (assignor to himself and Charles Braches), Centreton, Mo.
109,888.—BEE-HIVE.—James W. Gladding, Normal, Ill.
109,889.—SPRING BED-BOTTOM.—Charles Glenn, Allegheny City, Pa.
109,890.—BREECH-LOADING FIRE-ARM.—Charles Green, Rochester, N. Y., assignor to Charles Parker, Meriden, Conn.
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109,900.—SAWING-MACHINE.—Daniel Heller, Milton Center, Ohio.
109,901.—COFFEE-POT.—Louis Hildenbrand, Michigan City, Ind.
109,902.—FAUCET.—Jacob Hills, Haydensville, Mass.
109,903.—MACHINE FOR BEATING AND CLEANING HAIR.—George P. Halloway and William J. Huey, Portland, Ind. Antedated November 26, 1870.
109,904.—DIRECT-ACTING STEAM-ENGINE.—William Davis Hooker, San Francisco, Cal.
109,905.—HAY-PRESS.—Henry C. Hunt, Indianapolis, Ind.
109,906.—STOP-VALVE.—Charles Emery Hutson, Commerce, Mo.
109,907.—TIRE FOR TRACTION-ENGINES.—Oliver Hyde, Oakland, Cal.
109,908.—LUBRICATOR FOR STEAM-ENGINES.—Francis Jackson, Wigan, assignor to William Prosser, Manchester, England.
109,909.—BASE-BURNING FIRE-PLACE HEATER.—Julius Jaeger, Tompkinsville, N. Y.
109,910.—SAWING-MACHINE.—Per Johnson, Columbia, Cal.
109,911.—WIND-WHEEL.—John H. Kimble, Samuel Kimble, and George W. Kimble, Fox Lake, Wis.
109,912.—LATHE.—Samuel U. King, Windsor, Vt.
109,913.—WRENCH.—Christian Knisely, Chicago, Ill.
109,914.—REVOLVING FIRE-ARM.—Charles J. Linberg and William J. Phillips, St. Louis, Mo.
109,915.—MITER-BOX.—Charles F. Linscott, Chicago, Ill.
100,916.—COMBINED HAND SEED-DRILL AND CULTIVATOR.—Samuel D. Lucas, Winterpock, Va.
109,917.—PUTTING UP POMATUM.—Elard Ludde, New York city.
109,918.—IRONING TABLE.—James H. Mallory, La Porte, Ind.
109,919.—CHURN.—Chelton Matheny, Greensburg, Ind.
109,920.—FLOCK-MACHINE.—William McAllister, Lawrence, Mass.
109,921.—PIANO ACTION.—Frazee B. McGregor, Pontiac, Mich.
109,922.—PADLOCK.—William McIntyre, New York city.
109,923.—CORN-PLANTER.—Noah Mendenhall, Greensburg, Ind.
109,924.—WASHING-MACHINE.—Samuel S. Middlekauff, Hagerstown, Md.
109,925.—WATER-WHEEL.—Mordecai Millard, Franklin, Ohio. Antedated Nov. 26, 1870.
109,926.—TURBINE WATER-WHEEL.—Ransom Monroe, Hendrick's Creek, Pa.
109,927.—THILL-COUPLING.—Francis B. Morse (assignor to himself and H. D. Smith & Co.), Plantsville, Conn.
109,928.—APPARATUS FOR DRESSING AND FURROWING MILLSTONES.—James Lee Norton, London, England.
109,929.—CAST-IRON PLOW.—John K. Odell and William S. Little (assignors to G. W. Coe), Deckertown, N. J.
109,930.—COUPLING FOR EARTH-BORING AUGERS.—Thomas Orchard, Lincoln, Cal.
109,931.—METALLIC CARTRIDGE.—William I. Page, East Boston, Mass. Antedated Nov. 26, 1870.
109,932.—CAR-COUPLING.—Jay R. Palmer (assignor to himself and James H. Hatch), Mariposa, Cal.
109,933.—SHOE-LACING HOOK.—Alphonso Patten (assignor to himself and Robert W. Rumery), Biddeford, Me.
109,934.—CORN-PLOW.—Elwood Phillips, Centreville, Ind.
109,935.—SKATE.—Alfred C. Platt, Sandusky, Ohio.
109,936.—CORN-PLANTER.—Henry G. Porter, Hopkinton, Iowa.
109,937.—HALTER.—Robert Porter, Ottumwa, Iowa.
109,938.—WASHING MACHINE.—Samuel Post and Henry D. Martin, Ypsilanti, Mich.
109,939.—LETTER BOX.—Albert Potts, Philadelphia, Pa.
109,940.—COKE FURNACE.—Thomas Price, Steubenville, assignor to himself and James Cruthers, West Newton, Ohio.
109,941.—BUCKLE.—Francis Puetz, Buffalo, N. Y.
109,942.—APPARATUS FOR COOLING SODA WATER AND OTHER LIQUIDS.—Alvan Davis Puffer, Boston, Mass.
109,943.—WAGON-SEAT FASTENING.—John Calvin Rankin, Mount Vernon, N. Y.
109,944.—MARINE ENGINE.—W. B. Reaney, Chester, Pa.
109,945.—CORN SHELLER.—George W. Reisinger (assignor to William A. Middleton and Eugene Snyder), Harrisburg, Pa.
109,946.—SCRUBBING BRUSH.—Ralph Rockwell and Zora B. Custer, Petroleum Centre, Pa.
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109,948.—APPARATUS FOR PITCHING AND COATING BARRELS, CASKS, ETC.—Louis Schulze, Baltimore, Md.
109,948.—WRENCH.—Eliphalet S. Scripture, Brooklyn, E. D. N. Y. Antedated Nov. 25, 1870.
109,950.—ELEVATOR AND DISTRIBUTER.—Thomas Shanks, Baltimore, Md.
109,951.—DIRECT-ACTING ENGINE.—Sydney F. Shelbourne, New York, and Charles E. Emery, Brooklyn, E. D. Antedated Nov. 28, 1870.
109,952.—POCKET ALARM.—Calvin W. Simonds (assignor to Hollis Towne), Boscawen, N. H.
109,953.—BEVELING THE EDGES OF CIRCULAR PLATES OF METAL.—William H. Singer, Pittsburgh, Pa.
109,954.—ALARM LOCK.—Thomas P. Sink, Fairton, N. J.
109,955.—PUMP.—John P. Sivertson, Chicago, Ill.
109,956.—WAGON FOR LOADING TIMBER.—Jacob Skeen, Mound City, Ill.
109,957.—SLEIGH BRAKE.—Henry W. Smith, Rainsburg, Pa.
109,958.—CORKSCREW.—John A. Smith, Brooklyn, N. Y.
109,959.—COMBINED HIGH AND LOW WATER INDICATOR.—Levi F. Smith, Philadelphia, Pa.
109,960.—SHIFTING SHOVEL PLOW.—Adam Snyder, Packard, Ohio.
109,961.—BOX FOR PACKING BOTTLES.—Joseph Jones Solomon, Philadelphia, Pa.
109,962.—DOOR SPRING.—William H. Stafford, New York city.
109,963.—DIRECT-ACTING ENGINE.—William J. Stevens, New York city.
109,964.—DRAW HANDLE.—Caspar A. Stock, New York city.
109,965.—END-GATE FOR WAGONS.—Roderick F. Stocking and Calvin P. Greene, Lawn Ridge, Ill.
109,966.—END-GATE FOR WAGONS.—Roderick F. Stocking and Calvin P. Greene, Lawn Ridge, Ill.
109,967.—HORSE POWER.—Lorenzo P. Teed, Mechanicsburg, Pa.
109,968.—STOVE GRATE.—John Merritt Thatcher, Bergen, N. J.
109,969.—COAL SCREEN.—Edward Thomas, Shickshinny, Pa.
109,970.—BURGLAR ALARM.—James Harry Thorp, New York city.
109,971.—ALARM ATTACHMENT.—James H. Thorp, New York city.
109,972.—WATER WHEEL.—Josiah Turner and Stephen Woodward, Sunapee, N. H.
109,973.—CLEVIS FOR SLED.—John Van Antwerp, Cleveland, Minn.
109,974.—POTATO DIGGER.—Nicholas Vandenburgh, Schuylerville, N. Y.
109,975.—FIRE EXTINGUISHER.—Wm. P. Van Deursen, Cincinnati, Ohio.
109,976.—FIRE EXTINGUISHER.—J. B. Van Dyne, Covington, Ky.
109,977.—CARRIAGE WHEEL LUBRICATOR.—S. S. Vollum and W. H. Green, New York city.
109,978.—MACHINE FOR POLISHING COFFEE.—C. C. Warren and J. B. Baldy, Toledo, Ohio.
109,979.—TWINE HOLDER.—R. L. Webb, New Britain, Conn.
109,980.—STEAM PUMP.—George M. Weinman, Columbus, Ohio.
109,981.—LANDAULET CARRIAGE.—Edward Wells, New Haven, Conn.
109,982.—MODE OF SETTING TIRE ON WHEELS.—Aaron O. Wheeler, St. Augustine Depot, Ill.
109,983.—FRUIT BASKET.—Geo. H. White, Huntington, N. Y. Antedated Nov. 26, 1870.
109,984.—CANAL WASTE-WAY AND SLUICE GATE.—A. J. Whitney, Harrisburgh, Pa.
109,985.—COMBINED GRAIN HARVESTER AND BINDER.—J. H. Whitney, Rochester, Minn.
109,986.—BEEHIVE.—R. A. Williams, Colusa, Cal.
109,987.—MACHINE FOR POINTING NAILS.—H. A. Wills (assignor to National Horse-Nail Co.), Vergennes, Vt.
109,988.—HOISTING MACHINE.—Nicolaus Wonlarlarsky, St. Petersburgh, Russia.
109,989.—WATCH CASE.—A. A. Wood, Charlotte, Mich.
109,990.—COMPOUND FOR TREATING MALT LIQUORS.—Wm. Zinsser, New York city.
109,991.—MANUFACTURE OF SUGAR OR SIRUP FROM SWEET POTATOES.—Charles Delamarre (assignor to himself, John A. Thurber and Robert R. Benson), New Orleans La.
109,992.—AQUATIC TOY.—A. W. Hart (assignor to himself and W. M. Tileston), Washington, D. C.

REISSUES.

4,192.—MANUFACTURE OF PLATED METAL BRACKET.—John Barclay, Bergen, N. J.—Patent No. 94,064, dated August 24, 1869.
4,193.—SLEEPING COLLAR.—Levi Dederick, New York city.—Patent No. 103,026, dated May 17, 1870.
4,194.—HARVESTER RAKE.—H. H. Scoville, Oakland, Cal., assignor of one half interest to J. A. Scoville.—Patent No. 23,613, dated April 12, 1859.
4,195.—TREENAIL.—N. L. Tomlinson, Mystic Bridge, Conn.—Patent No. 78,554, dated June 2, 1868.

DESIGNS.

4,501.—LAMP CHIMNEY CLEANER.—Emeline T. Annis, Mount Morris, N. Y.
4,502.—DRAWER PULL.—Nelson Merriam, West Meriden, Conn.

TRADE-MARKS.

83.—CHOPPING AX.—Bœtticher, Kellogg & Co., Evansville, Ind.
84.—UMBRELLA AND PARASOL.—Dawes, Fiske & Fanning, New York city.
85.—TOILET SOAP.—Deniker & Mellville, New York city.
86 to 88.—BROOM.—R. W. English, Buffalo, N. Y. Three Patents.
89.—WHISKEY.—Frieberg & Workum, Cincinnati, Ohio.
90.—WHISKEY.—C. P. Moorman & Co., Louisville, Ky.
91.—CORN PLANTER.—Pope & Baldwin, Quincy, Ill.
92.—CIGAR.—Rawson & Philbrick, Key West, Fla.
93.—LINIMENT.—Ridenour, Coblentz & Company, Springfield, Ohio.
94.—UMBRELLA AND PARASOL.—James T. Smith, New York city.
95.—BAKING POWDER.—Thompson & Steele, Chicago, Ill.

EXTENSIONS.

EDGE KEYS.—G. C. Todd, of Lynn, Mass.—Letters Patent No. 16,128, dated Nov. 25, 1856.
METHOD OF CLAMPING CUTTERS IN THE CUTTER HEADS FOR PLANING MACHINES.—J. P. Grosvenor, of Lowell, Mass.—Letters Patent No. 16,144, dated December 2, 1856.

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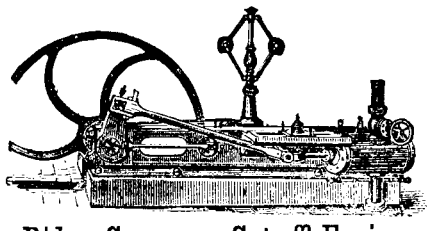

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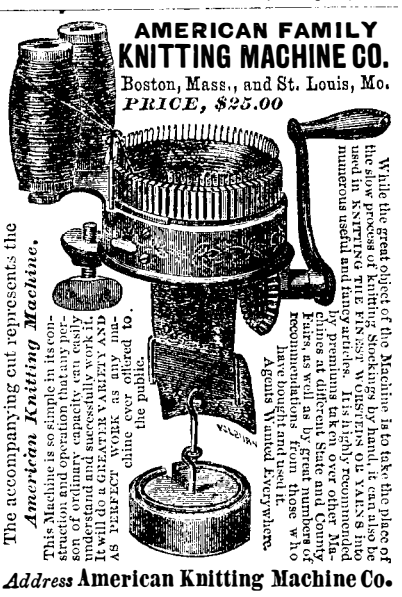

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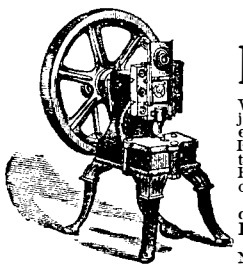

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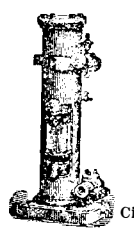

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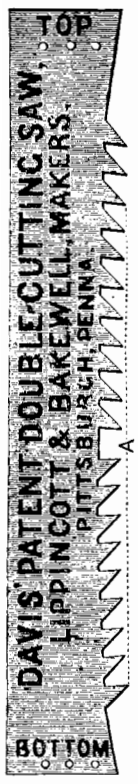

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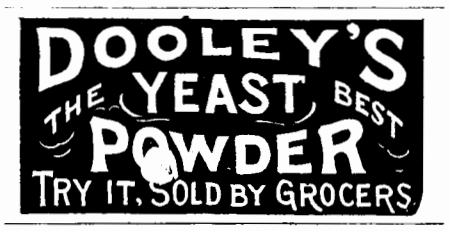

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